

PERSONAL TEMPO AS A CONSIDERATION IN THE RHYTHMIC
TRAINING OF FIRST-GRADE STUDENTS

By

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The foundation of rhythm in most Western music is the steady beat. In order for first-grade children to understand the more complex elements of rhythm such as meter and rhythm patterns, they must develop a sense of steady beat. Not all children, however, are equally capable of maintaining a steady beat. A possible explanation for this inequity is the phenomenon of personal tempo.

To determine if each subject has a personal tempo (PT) that is consistent, a test of PT was administered to each subject four times during a two-week period. Correlation coefficients indicated within-subjects consistency.

The second portion of this study was designed to determine if students are most successful when synchronizing movement with music that is near their PT. Synchronization

ability was measured using Froseth's Primary Measures of Kinesthetic Response (PMKR), which contains fourteen items with tempos ranging from M.M.=57 to M.M.=130. For analysis, the test items were divided into three categories (slow, moderate, and fast) and the subjects were divided into three PT groups (slow, moderate, and fast). ANOVA for each category of test items indicated that the PT group's scores were not significantly different beyond the .05 level on the slow, moderate, or fast items. This suggests that PT does not affect the ability to synchronize movement with different tempos.

The purpose of the third portion of this study was to determine if students can be taught more effectively to keep a steady beat when their PTs are considered during instruction. The subjects in two experimental classes were divided into groups according to their PT: slow, moderate, and fast. Using the mean PT of each group as a starting point, these students were taught to keep a steady beat at a variety of tempos. Students in two control classes were randomly divided into small groups and taught to keep a steady beat with a consistent tempo. The PMKR was administered as the posttest. Repeated measures ANOVA indicated that, although the experimental group did not improve significantly more than the control group, both groups demonstrated an increase in scores on the posttest that was significant beyond the .01 level. This suggests that students are able to synchronize movement with music at

a variety of tempos through musical maturation and practice at a single tempo.

CHAPTER 1 INTRODUCTION

The temporal nature of rhythm distinguishes it from other aspects of music. Rhythm serves both organizational and expressive functions that determine the manner in which music moves through time. An understanding of rhythm and its components--beat, tempo, meter, accent, and rhythm patterns--can help people experience the movement of music more fully.

The steady recurring pulse usually experienced in music is called the "beat." The speed of the beat is referred to by the word "tempo." Most music, however, is not performed at a uniform tempo throughout; *accelerandos* (gradual increases in tempo), *ritardandos* (gradual decreases in tempo), and other musical effects provide variety in a composition. These graduated changes in tempo may last only a short time or they may last for many measures. They may also be very subtle or quite obvious. The use of *rubato*, or a slight flexibility of the tempo, evokes a reaction in the listeners by creating a feeling of rushing forward or holding back that is relieved by a return to the original tempo.

"Meter," or the grouping of beats, is most frequently found in twos or threes--duple or triple meter. The regularity of these groupings was challenged in the late

19th century with rhythmic effects such as changing meters, asymmetrical meters, and the superimposing of one meter over another. Accents may occur regularly or irregularly, and their strength may vary. They may coincide with the beat or occur between beats, which causes syncopation.

Rhythm patterns are formed by combining short and long sounds; the resulting patterns may be simple or quite complex. They can be varied, developed, and combined in ways that provide unity and contrast in a composition (Reimer & Evans, 1972).

Significance of the Study

The ability to perceive the relationships of beat, tempo, meter, accent, and rhythm patterns is a vital part of the aesthetic experience involving music. In Western music, steady beat provides the basis for the other components of rhythm. Gordon (1980) states that a sense of consistent tempo is necessary for the study of meter and rhythm patterns. In addition, kindergarten and primary grade basal series texts such as Music and You (Staton & Staton, 1988), Music (Meske, Pautz, Andress, & Willman, 1988), and World of Music (Palmer, Reilly, & Scott, 1988) devote a great deal of space to the study of steady beat. The foundation for the development of rhythmic understandings and skills, then, is the concept of steady beat.

The ability to perceive and perform a steady beat is a skill that must be learned; it is not inherent in each individual. Music educators must include teaching methods and techniques that can assist students in developing this

skill. Research findings help teachers identify those techniques that can be incorporated into their classrooms that will enhance students' musical skills and understandings.

Rhythmic Perception and Movement

Rhythmic perception is often encouraged through the use of movement and classroom instruments. The physical nature of rhythm forms the basis of the methods of Carl Orff and Emile Jaques-Dalcroze (Landis & Carder, 1972). Orff thought that rhythm was a natural outgrowth of speech. In his Schulwerk (1967), rhythms are introduced through the use of chants, rhymes, and jingles. The rhythms are then transferred to body rhythms such as clapping, patschen (patting knees), finger snapping, and stamping. As the body rhythms are mastered, they are transferred to instruments.

Large body movements are stressed in the eurythmics of Jaques-Dalcroze, who found rhythmic implications in children's everyday activities. Singing games and dramatic play become tools for teaching rhythmic concepts. For example, pretending to run and catch the bus becomes an *accelerando*; activities such as walking, skipping, and running are eventually associated with notated rhythms. Walking, for example, is associated with a quarter note. Running may be associated with eighth notes, triplets, or sixteenth notes. Skipping may be associated with long-short patterns such as a dotted eighth followed by a sixteenth note (Findlay, 1971). Classroom instruments offer additional means to interact with music with a minimum

amount of instruction. Because most of these instruments are non-pitched, students can experience steady beat, metrical groupings, and rhythm patterns without the confounding effects of melody. Precise responses are required to produce the correct attack, duration, and accent (Mursell, 1956). Movement and classroom instruments have become integral parts of the music classroom as vehicles for teaching music concepts. The ability to synchronize movement with music is often a prerequisite for performing such tasks.

The Synchronization of Movement with Music

Teachers who include the use of movement and instruments in their classrooms quickly observe that not all students are able to synchronize their movements with the music. When asked to keep a steady beat, some students rush ahead while others fall behind. Others confuse the beat with the rhythm patterns of the notes, or beat the off-beats. Some begin without listening to the music first, and still others keep the same speed with seeming disregard for the tempo of the music.

A potential variable affecting a student's ability to synchronize music and movement is personal tempo. Jaques-Dalcroze (1921) alluded to this possibility in his writings: "This education aims at restoring to the child his complete corporal mechanism and freeing his 'natural rhythm' . . . from the inhibitions which too frequently impede its expansion" (p. 326). Driver (1936) also proposed that each child has an "individual rhythm" with its own "movement,

speed, and character" (p. 5) and that the teacher's first goal is to try to find each child's rhythm. The consequence of ignoring this individual trait, according to Driver, may have a detrimental impact on learning.

To each his own rhythm is a natural law. It will be clearly seen that there must be no 'forcing of the pace,' for this will disturb the child's natural rhythm. It is equally disturbing for an ardent temperament to be made to conform to the pace of a teacher's possibly slower rhythm. The disturbance of rhythm produces nervous illness if persisted in, the first symptoms of which are seen in the jerky and spasmodic movements of some children. (p. 6)

The relationship between personal tempo and synchronization ability was first investigated by Walters (1983). He found that as the tempo of the music deviated from students' personal tempo, their synchronization ability decreased. His comments provide the basis for this study:

Personal tempo is not a defect. . . . It is rather a natural trait carrying important, basic information about the uniqueness of the individual. Personal tempo offers a starting point for rhythm education, a hub around which an orientation to other tempos can be built. With the comfort of personal tempo smoothing the way, a child might easily accomplish the first step in rhythm learning, which is to feel and kinesthetically respond to a consistent musical tempo. (p. 128)

Walters has introduced a potentially important variable in the teaching of rhythm. His research findings indicate that each child (K-3) has a personal tempo that differs from other children. Furthermore, it is possible that a child's personal tempo can limit the ability to synchronize movement with a variety of tempos. Walters suggested that the teacher who asks children to perform rhythmic tasks

requiring synchronization without regard for this characteristic may indeed be hindering student progress.

Purpose of the study. This study sought to determine if rhythmic learning can be facilitated by adjusting instruction to accommodate students' personal tempos. Until now, personal tempo has remained unexplored with regard to its direct impact on music learning. If music educators are to "begin where the child is" then the personal tempo of a child may be an important consideration when asking children to perform tasks that require the synchronization of movement with music. A statement by Walters (1983) aptly describes music teachers' responsibility regarding the needs of individual students.

The responsible educator dare not ask the individual to simply fit a system. He must rather offer a system which can serve individuals. Given the importance of this tenant [sic], and given the predisposition of today's music educator to incorporate physical movement of children into the teaching/learning process, personal tempo is a dimension whose investigation is warranted. (p. 11)

Statement of the Problem

The purposes of this study were to investigate

1. whether the speed of an individual's spontaneous movement is characterized by a consistent tempo over time,
2. the effect of personal tempo on the ability to synchronize movement with a variety of tempos, and
3. if children can be taught more effectively to keep a steady beat by using personal tempo as a starting point.

Hypotheses

The null hypotheses for this study are

1. there will be no relationship among four personal tempo measurements for individuals over time,
2. there will be no significant difference between mean scores on a measure of synchronization ability for those students with fast, slow, and moderate personal tempos, and
3. there will be no significant difference between the mean scores on a measure of synchronization ability for those students who received instruction adjusted for their personal tempo and those students whose instruction was not adjusted according to their personal tempo.

Limitations and Delimitations

Limitations

The random assignment of subjects is, of course, desirable for achieving equivalence between the control and experimental groups. It is often not possible, however, to assign subjects to experimental and control groups randomly, particularly in school settings. In this study, the time requirements for pretest, posttest, and treatment, as well as the commitment required on the part of the teachers, made it necessary to recruit teachers to assist in this study rather than choose them by a random selection process. While the classes that participated in the study were not

randomly chosen, they were randomly assigned to the experimental or control group.

In order to limit disruption of the teachers' classrooms, the duration of the treatment was limited to twelve class sessions. Identical pre- and posttests are usually cited as a source of internal invalidity. However, accurate synchronization is a somewhat complex skill that cannot be learned during one short pretest. Therefore, the use of identical pre- and posttests, while not ideal, does not detract from the validity of the results presented in this study.

Delimitations

Because small-group instruction is a feasible means of meeting diverse needs in a classroom and because it enables teachers to make specific feedback on student performances, small-group instruction was selected for the experimental treatment.

Subjects in this study were in the first grade. Therefore the generalizability of the results is limited to students of that grade level. The results are also limited to those students with similar socio-economic status and the two types of schools represented, one of which is rural with a predominately black population and the other suburban with a predominately white population. No attempt is made to relate personal tempo with other aspects of the children's development.

Synchronization ability, as measured in the Primary Measures of Kinesthetic Response (Froese, 1987), is limited

to the subject's ability to keep a steady beat using patschen and to the range of tempos represented in the test (M.M.=57 through M.M.=130).

The content covered during instruction was limited to only the ability to keep a steady beat. No other aspect of rhythm or music was explored. In addition, the novelty of small-group instruction, as well as the additional feedback that was available for students, may have led to some learning gains regardless of whether the students were in a control or experimental group--the Hawthorne effect.

Assumptions

The first assumption is that the students made an honest effort to accomplish the proposed learning objectives. The second is that this effort was equal between the control and experimental groups. The third is that the 12 units of study allotted for the treatment represented a reasonable test of the idea of teaching rhythmic synchronization through adjusted tempos.

Definition of Terms

Between-subject variability is the variability of personal tempos among a number of subjects.

Generality of personal tempo refers to the usual tempo as "a generalized psychomotor trait permeating the rate at which we execute any and all spontaneous movements" (Harrison, 1941, p. 343).

Personal tempo, a psychological trait, is "the inborn rate of speed at which an individual tends to move and which

tends to differ from the same measure in other individuals" (Walters, 1983, p. 37).

Specificity of personal tempo refers to personal tempo as determined by the rate of a specific movement rather than all spontaneous movements.

Within-subject variability is the variability in a subject's personal tempo from one measurement to the next.

Synchronization ability is used in this study as a reference to the ability to keep a steady beat "in time" with music.

CHAPTER 2 REVIEW OF THE LITERATURE

The review of the literature pertaining to rhythm and tempo perception is divided into two major sections: "The Role of Kinesthesia in Music Teaching and Learning" and "Personal Tempo." In the first section, the philosophical basis for movement and its application in the methods of Carl Orff, Zoltan Kodaly, and Emile Jaques-Dalcroze are discussed. Although the theories of Orff, Kodaly, Jaques-Dalcroze are not based on systematic research, their importance lies in their impact on music education through their techniques, which have become integrated into many American classrooms. The review of empirical research supports the use of movement in music teaching and learning.

Children's ability to synchronize movement with music is also addressed in this review of the literature. Research data have shown that tempo may be an important variable that can directly influence children's synchronization ability. Finally, this section explores what music education textbooks say about adjusting tempo during instruction.

The phenomenon of personal tempo has received much less attention than kinesthesia, although the results of several studies point to its existence. Furthermore, a recent study by Walters (1983) indicates that an individual's personal

tempo may have an impact on his/her ability to synchronize music and movement.

The Role of Kinesthesia in Music Teaching and Learning Philosophical Theory

The importance of kinesthetic activity in music teaching is supported by writers in the area of aesthetics such as John Dewey, Leonard Meyer, and Bennett Reimer. They believe that movement is an integral aspect of music education that can help children achieve the level of understanding necessary to experience music aesthetically. Dewey (1934), for example, stated that motor preparation is a large part of aesthetic education. He wrote that a lack of training in the area of motor skills may result in a confused response to an aesthetic object. However, the previous experiences afforded by movement in aesthetic education prior to an encounter with art can enhance perception.

Meyer (1967) emphasized the importance of learning about music at an early age and the role of kinesthetic activity in facilitating knowledge in young children.

It should be noted that early learning is not merely mental. Our ability to learn to perceive visual and auditory patterns is not solely a function of what the senses feed into our nervous system but depends in important ways upon the presence of concurrent motor behavior which is, so to speak, fed back into and thereafter guides the discoveries of the senses. (p. 275)

Reimer (1970) stated that singing, performing, and creating are effective means of conveying musical elements such as harmony, melody, and rhythm. These techniques allow

children to interact with and manipulate the various elements of music directly and, as a result, increase aesthetic perception. Other music educators have addressed the role of movement in music education. Driver (1936) expressed her thoughts in these words:

Perhaps in all of us there is a greater sense of movement than of music, so, for the first steps of the child's education . . . movement is the more active partner, but true balance is slowly reached as the child learns to listen while he moves, applying his mind to what he hears and then expressing it in action. (p. 5)

Gordon (1980) emphasized the importance of body movement at the aural/oral level, which he maintained is the most fundamental stage of discrimination learning. According to Gordon, listening to music is the aural process. While listening to adults sing and hearing recorded music, children develop a sense of consistency of tempo that is necessary to develop a sense of meter and rhythmic patterns. Performance is the oral process and, according to Gordon, it may take the form of singing, large and small body movements, and the use of rhythm instruments.

Applied Theory

The teaching methods developed by Orff and Jaques-Dalcroze are based on their theories regarding rhythm and movement. The contributions of Jaques-Dalcroze are based on his observations of students and the years he spent developing techniques designed to help students overcome problems of rhythm, pitch, tonality, intonation, and musical expression. These techniques are based on his theory of kinesthesia. According to Jaques-Dalcroze (1917), conscious

kinesthetic experiences are converted into feelings, which are then sent through the nervous system to the brain. The brain analyzes the information and sends it back to the body. Eurythmics, the term Jaques-Dalcroze coined for his method, is based on this theory, and it utilizes listening and movement to teach children to express such elements of music as beat, tempo, duration, rests, syncopation, asymmetrical meters, polyrhythms, rubato, dynamics, phrasing, and form.

The influence of Jaques-Dalcroze can be seen in the techniques developed by Orff (Landis & Carder, 1972). Orff believed that rhythm is the strongest element of music. This is evident in the fact that the primary techniques of his method--speech, singing, and movement--all have the element of rhythm in common. In the sequence of activities developed by Orff, the rhythmic qualities of speech lead to the use of body rhythms, which are then transferred to instruments. Singing is viewed as an outgrowth of speech, and the untrained movements of children such as running, walking, and skipping are related to musical concepts.

While singing is the primary mode of instruction in the Kodaly method, which was developed by Zoltan Kodaly in the 1940s and 1950s, movement is an important part of this method as well (Landis & Carder, 1972). Like Orff, Kodaly believed that singing and movement are natural in young children. Singing games combining movement and music are used in preschool and kindergarten classes. The second volume of his Pentatonic Music is called "100 Little

Marches," to which children step, clap, and tap the beat, meter, and rhythm of songs. The ability to perform these elements of rhythm is necessary before the teacher can introduce rhythmic patterns (Landis & Carder, 1972).

Research on the Role of Kinesthesia in Music Learning

Research data also support the importance of kinesthesia in music learning. Ruckmich (1913) studied the reactions of adults to rhythmic stimuli. He concluded that "kinesthesia was most prominently connected with the initial clear perception of the type and form of the rhythm" (p. 359) and that once perception is established kinesthesia becomes unnecessary.

Ruckmich's findings were corroborated in a study by Boyle (1970), who incorporated 14 weeks of rhythm training into junior high school bands. The activities included listening to recordings to recognize the beat, marking time to the beat, clapping patterns while tapping the beat with the foot, and playing rhythmic patterns on a single note while marking the beat with the foot. The results indicated that these body movements contributed significantly to the students' ability to perform rhythms correctly.

A study by Joseph (1983) also indicates that the use of movement can enhance rhythmic learning. Joseph developed a curriculum of 44 lessons using Dalcroze eurythmics for kindergarten students that included movement exploration, rhythmic movement, ear training, listening, and improvisation. The experimental groups participated in the eurythmics program and the control groups received their

regular music instruction consisting of singing, listening, playing rhythm instruments with recordings, singing games, and some movement. At the conclusion of the study the children in the experimental group were found to be more able to recognize and respond to familiar patterns in unfamiliar music through movement and playing instruments than the students in the control groups.

Moore (1984) found that rhythmic aptitude was enhanced by incorporating movement into music instruction. Moore administered Gordon's Primary Measures of Musical Audiation (PMMA) to three groups of 100 second- and third-grade students. During next 10 weeks an experimental group received 20 music lessons emphasizing rhythm through the use of movement activities such as body rhythms, walking, running, and skipping to various rhythms. One control group was taught using vocally oriented lessons that included singing and listening. Another control group received no musical instruction. At the conclusion of the 10-week period the PMMA was readministered.

The rhythm aptitude scores were significantly higher for the group that received music instruction incorporating movement. Moore also observed that the movement lessons had more impact on the second-grade students, that repetition enabled the children to establish a rhythm more consciously, that sustaining patterns over a long period of time was more difficult for younger students, and that the younger students had more difficulty controlling body movements.

Tempo and Synchronization Ability

To develop methods for measuring children's musical development, a series of studies were conducted by Williams, Sievers, and Hattwick (1932). Williams tested the ability of 197 children to keep a steady beat with a ticking clock; the ages of the children ranged from three to eight years. Synchronization scores improved with age. Seventy percent of the three-year-old children failed, but none of the seven- and eight-year-old children failed. During the course of the study it was noted that some of the children tapped along regularly while others tapped irregularly, lagged behind, or rushed ahead.

As a follow-up to this study, Williams tested 68 children to determine their ability to keep a steady beat at different tempos. The subjects in this study ranged from 3 1/2 to 6 1/2 years of age. Williams observed the same difficulties that appeared in his previous study and commented on "a real and persistent tendency for individual differences to appear" (p. 45). Only 32 subjects were successful at keeping a steady beat at all with different tempos; others anticipated the beat or fell behind.

Sievers studied the ability of 84 children (grades one through six) to keep a steady beat at various tempos. He found that the younger children were more accurate at faster speeds and less accurate at slower speeds. In addition, the younger children had more difficulty with varying tempos. Jersild and Bienstock (1935) conducted a three-year longitudinal study of children's synchronization ability and

found a significant increase in ability with each successive year between the ages of two and five. Moreover, a further analysis of the same three-year-old children indicated that young children may be able to synchronize movement more easily at faster tempos. No significant difference was found in their ability to keep time with their hands and feet. The difference between children's ability to synchronize with various meters (2/4, 3/4, 4/4) was also insignificant.

The relationship between age/grade level and children's (grades 1-3) ability to synchronize body movement with rhythmic stimuli was further confirmed in a study by Groves (1966). He noted that responses were more accurate if the tempos were faster; at slower tempos the tendency was to anticipate the beat. Motor ability was also found to be a significant variable while home musical background, social adjustment, and sex appear to be unrelated.

To understand the nature of rhythmic ability more fully, Thackray (1969) administered tests of rhythmic perception, rhythmic performance, and rhythmic movement to students at a women's college of physical education. The results of the rhythmic perception test, which was administered to 100 subjects, suggest that perception is measured more accurately by performance than by tests of perception.

The results of the two other subtests provide information on the ability to synchronize movement with music. During a test of rhythmic performance, 66 subjects

maintained a steady beat by tapping. Ten test items were presented at various tempos ranging from M.M.=31 to M.M.=204. Thackray observed that there was a tendency to be too slow in the faster test items and too fast in the slower items. During the test of rhythmic movement, which was administered to 30 subjects, selections of music were played that contained changes of tempo. The subjects were asked to keep time with the steady beat using any type of dance step that seemed appropriate. Thackray remarked that most of the subjects were confused by the subdivisions of the beat and attempted to show the rhythm rather than a steady beat; others began moving before they had an opportunity to feel the pulse of the music.

Thackray later conducted a similar study (1972) of children to see if the same relationship exists between perception and performance. A series of tests were given to 40 boys and girls who were 11 years of age. These tests measured perception, the ability to imitate rhythm patterns, and the ability to keep time with the music showing strong beats and weak beats. Again, Thackray found a significant correlation between perception and performance. He also noted that, like the adults, the children were more successful at imitating patterns than maintaining a steady beat. Thackray suggested that the ability to maintain a steady pulse might be a specific aspect of rhythmic ability. Subjects who were not able to keep a steady beat varied in the types of errors. Some children began too soon; some could only keep a steady beat at the end. Others would wait

for the next beat to occur rather than anticipate, and a few children beat the off-beats. Thackray also noted cases in which children produced a steady beat that did not match the music. In these instances, the students gave the beat at the same tempo each time regardless of the tempo of the music. Thackray suggested that tempo preferences needed to be investigated further.

Adjusting Tempo During Rhythm Instruction

Studies by Williams, Sievers, and Hattwick (1932), Jersild and Bienstock (1935), Groves (1966), and Thackray (1972) indicate that varying the tempo of tasks requiring synchronization may improve synchronization ability. While textbooks used in the training of music education students address the issue of varying tempo, they vary in the amount of emphasis that is placed on the topic.

Teaching Music in the Twentieth Century (Choksy, Abramson, Gillespie, & Woods, 1986) addresses this matter a number of times during the discussion of the Dalcroze and Orff methods. While describing beginning Dalcroze eurhythmics exercises, it suggests that children be allowed to perform locomotor activities at a tempo that is comfortable to them. After observing the class, the teacher is to determine the average tempo of the class; this becomes the starting tempo for the class. During the first exercise that uses music, the teacher is to accompany the children using speech, singing, the drum, or the piano. The accompaniment is to match the "tempo, dynamics, and flow characteristics" of the students (p. 160). With regard to

the Orff and Dalcroze methods, the book suggests that the teacher have the class practice skills using a variety of tempos. Abramson emphasizes the importance of this in his discussion of Dalcroze teaching techniques:

It is important to learn how to erase one tempo and prepare for the change to another. In general, the ability to perform in one tempo does not automatically give the ability to deal with many tempi. Speaking, singing, moving, or playing an instrument all involve restrictions on tempo experience and experiment, but this can be counteracted by the teacher's awareness and skill in presenting a large variety of tempo experiences. Staying too long in one tempo can give rise to tension, boredom, or even inability to use the body and mind in a new tempo when called upon to do so. (p. 202)

Nye and Nye note the difficulty often posed by individual differences in Music in the Elementary School (1985). Early experiences in the areas of tempo and rhythm should be done at a speed that is comfortable to the children.

To assist children who find rhythm difficult, teachers seek to guide them to success either in the same rhythm at a slower tempo, or with a different and more simple action to which they can respond at their own natural tempos. (p. 247)

An innate preference for a particular tempo is suggested by Hoffer and Hoffer in Music in the Elementary Classroom (1987). They suggest that the most comfortable tempo approximates the heartbeat or a moderate walking pace. In Teaching Children Music: Fundamentals of Music and Method (1984) Newman describes activities that may be used to teach tempo in which the child moves at a comfortable speed and the other students or the teacher accompany the movement.

Conclusion

While the role of kinesthetic activity in the teaching and learning of rhythmic concepts is almost taken for granted by music teachers, researchers have provided some empirical research that supports this assumption. The results indicate that kinesthetic activity can raise music aptitude scores, facilitate rhythmic perception, and increase music students' ability to read rhythms. The performance of rhythmic tasks is also a more accurate measure of rhythmic ability than tests of perception. More important, kinesthetic activity is a tool that will increase children's ability to experience music aesthetically.

The findings of research studies also imply the need for music educators to consider the synchronization abilities of children when asking them to perform tasks that require synchronization. While some studies indicate that the ability to synchronize movement with music seems to be related to maturation, there is some evidence that points to tempo as a possible variable.

An unexpected outcome of these studies was the observation of individual differences with regard to the ability to keep a steady beat. In addition, it has been noted that some subjects performed a steady beat at the same tempo regardless of the tempo of the music. The potential variables of tempo and tempo preferences lead to a third theory, personal tempo, which is presented in the next section.

Personal Tempo

Friscisen-Kohler (1933) conducted a series of experiments on personal tempo. In one experiment, a series of tapping tests were administered to subjects on four different days. The intervals of time between measurements ranged from one or two days to two months. To allow for diverse moods and physical conditions, the subjects were retested at different times of the day and under different weather conditions. Despite the varying conditions and the amount of time between measurements, the subjects were consistent from one measurement to the next. To assess variability between individuals, Friscisen-Kohler tested 1000 subjects from various social backgrounds and from ages eight to more than eighty. Subjects of all ages and social strata demonstrated a diversity of tempos.

Friscisen-Kohler's study was also designed to identify the extent to which personal tempo is inherited. The personal tempo of 118 pairs of twins were studied: 53 were monozygotic (identical) twins and 65 were dizygotic (fraternal) twins. These results were compared with the personal tempos of brothers and sisters of different ages and unrelated individuals. The variation was much greater between dizygotic twins than between monozygotic twins. This result indicates that heredity may play a part in determining personal tempo. In addition, the variabilities of brothers and sisters of different ages and dizygotic twins appear to be nearly equal. The highest variability was

found among unrelated individuals, which supports the theory of variability among individuals.

Frischeisen-Kohler (1933) theorized that personal tempo may be a unitary trait that governs all psychobiological functions.

When we actively intervene in any happening, when we speak, or walk, or perform any deliberately willed action, we choose, quite spontaneously, a congenial tempo for the transaction in question--a tempo which is quite natural to us. . . . There is an individual tempo of the personality, the personal tempo, which is expressed more or less markedly in all our doings, in our acts of perception and our volitional processes. (p. 302)

Over a period of three months, Allport and Vernon (1933) administered over 30 tests to 25 male subjects between 18 and 50 years of age. Approximately four weeks lapsed between the first measurement and a repeat measurement. The speed of the individual's performance on a specific task was found to be consistent from one test session to another. Contrary to Frischeisen-Kohler's theory, Allport and Vernon did not find an overall personal tempo. Instead, they found that certain tasks tended to correlate more strongly than others, forming clusters. The first two clusters consisted of tests measuring verbal speed, such as reading and counting and drawing tests. The third cluster consisted of rhythmic activities like finger and hand tapping.

The results of other studies support the theory that an individual's personal tempo, as defined by a single task, cannot be generalized to other tasks. Harrison and Dorcus (1938) had male undergraduates perform several tasks at a

tempo they chose. These tasks included turning a crank, tapping, tracing, drawing a straight line, raising the right arm, turning the head, walking, and bending. No unitary speed trait was indicated. Tapping was found to be the most consistent measure. In addition, the data support the results of the previously cited studies, which indicate that individuals perform motor tasks at consistent speeds.

The specificity of personal tempo was supported in a further study by Harrison (1941) in which male undergraduate students performed 12 tasks involving simple motor and locomotor tasks and cognitive activities. All everyday functions such as walking did not correlate with other everyday functions such as head turning, arm raising, and body building, which disputes the theory that habituation may effect personal tempo. In addition, tapping and patting were found to be the most reliable measures.

An extensive study of personal tempo was conducted by Rimoldi (1951). Adult male subjects between the ages of 17 and 25 were administered 59 tests involving large and small motor movements, speed of perception (reaction time), and speed of cognition. A repetition of these tests four weeks later revealed a high degree of consistency of tempo between the first and second measurements. The best predictors of motor speed were found to be large movements of the limbs and trunk, small movements such as tapping, and, to a lesser extent, simple drawings of lines, circles, and squares with the feet. Speed of cognition and perception were not found to be related. Like Allport and Vernon, Rimoldi identified

clusters of related movements. He hypothesized that the speed of performance was best predicted by other tasks within the same cluster.

In later studies by Smoll (1975a, 1975b), subjects 18-31 years of age were asked to swing their arms upward and forward at the tempo which was "most convenient and natural" (1975a, p. 441). Like Rimoldi (1951), Smoll (1975a) found that the between-subjects variance was greater than the within-subjects variance, thereby "indicating that individuals have a personal or 'natural' preferences of voluntary movement tempo which differs from those of other individuals" (p. 442).

Using the same technique, Smoll and Schutz (1978) tested the preferred tempo of 200 subjects 18-31 years of age. The results of this study support the findings of previous studies, which suggest that there is a consistent speed at which individuals perform motor tasks most comfortably. Smoll and Schutz concluded with the following comment:

Little evidence is available regarding the presumed influence of preferred tempo on rhythmic accuracy. In considering factors which affect optimum performance, a fundamental issue thus involves the degree of accuracy when the task requires keeping in cadence with a tempo that differs from one's preferred tempo. Specifically, is a performer's spatial and/or temporal accuracy detrimentally affected while performing a motor rhythm task at a tempo that is faster or slower than his/her preferred tempo? This question deserves empirical attention. (p. 893)

Personal Tempo and Synchronization Ability

The relationship between personal tempo and the ability of young children to synchronize music and movement was

studied by Walters (1983). To determine the personal tempo of his subjects, Walters administered his Test of Personal Tempo to 96 children. The subjects were 24 children (12 male and 12 female) in each grade level from kindergarten to third grade. In this test the subjects were instructed to pat their hands on their knees for 15 seconds in a "steady beat that feels good to you" (p. 48). The number of beats per minute was then calculated from the middle 10 seconds of each performance. The personal tempo of each subject was calculated four times over a period of three weeks.

His results indicated that the intra-individual consistency and inter-individual consistency found by some researchers in adults is also present in young children. Only 18.75 percent of the subjects were judged by Walters to be too inconsistent to be measured for personal tempo. He did not suggest that these students do not have a personal tempo, but rather that his method of measuring personal tempo might have been inadequate for these students. In addition, the mean personal tempo decreased with age:

Kindergarten mean personal tempo	M.M.=114.6
Grade one mean personal tempo	M.M.=108.5
Grade two mean personal tempo	M.M.=104.4
Grade three mean personal tempo	M.M.= 99.5
(1983, p. 121)	

To study children's synchronization ability, Walters administered the Primary Measures of Kinesthetic Response. This test was developed was developed by James Froseth (1987) of the University of Michigan for the purposes of Walters' study. The test consists of 14 musical selections ranging in tempo from M.M.=57 to M.M.=130. At the beginning

of each selection, a woodblock dictates the tempo; when the woodblock ceases, the student pats the hands on the knees during the remainder of the selection. Walters videotaped the performances for later evaluation.

The results of the study indicated that students are most successful at synchronizing with the test items at or nearest to their own personal tempo. Walters found that "without deviation" students were most successful at synchronization if the tempo of the music fell within their personal tempo category: (a) slow, less than 80 beats per minute, (b) moderate, between 80 and a 110 beats per minute, and (c) fast, more than 110 beats per minute. As the tempo of the music differed from a child's personal tempo, it became increasingly difficult to synchronize movement with music. The relationship between synchronization ability and personal tempo appears to be strongest for students in the first grade. Walters also observed that on test items that were faster than the subject's personal tempo, they seemed to fall behind; on test items that were slower than the subject's personal tempo, the subject's movement was too fast.

Subjects with slow personal tempos scored the highest on test items from M.M.=57 through M.M.=81; second for items M.M.=85 through M.M.=100; and third for items M.M.=103 through M.M.=130. Subjects in the moderate personal tempo category scored first for test items M.M.=85 through M.M.=120; second for items M.M.=57 through M.M.=81; and second again, for M.M.=130. Subjects with fast personal

tempos scored first on one item, M.M.=130; second for items M.M.=85 through M.M.=120; and third for items M.M.=57 through M.M.=100.

The synchronization scores for the subjects in each category were averaged together. The subjects with moderate personal tempos scored the highest for eight of the test items. Subjects with slow personal tempos scored highest on five of the items and subjects with fast personal tempos scored highest on one item.

In addition, Walters found that it was easier for subjects to synchronize movement with music that is faster than their personal tempos than with slower music. Younger children tended to score lower on the synchronization test, which suggests that age level has an effect on the ability to synchronize music and movement. This tendency leveled-off between grades two and three.

Walters found a correlation between second- and third-grade students' scores and the rhythm section of the Primary Measures of Music Audiation, but this same relationship was not significant for kindergarten and first-grade students. Children with more prior music experience were more successful at synchronizing movement and music.

Conclusions

The limited amount of research in the area of personal tempo can, at best, lead only to tentative conclusions. Studies involving both young children and adults have identified an intra-individual consistency of speed related to motor tasks that varies from person to person. The

generalizability of speed from one task to another remains unclear. An understanding of this aspect of personal tempo is clouded by conflicting theories. Is personal tempo a unitary trait, is it task specific, or are there clusters of related movements? This answer is unclear.

Walters' research expanded the understanding of the effect of tempo by including personal tempo as a potential variable. He found that children (K-3) were able to synchronize their movement with music if the music was at or near their personal tempo. As the music deviated from a child's personal tempo, synchronization became more and more difficult. Both Walters (1983) and Driver (1936) point to the difficulties that may ensue if children are required to perform rhythmic tasks at a speed which deviates from their "individual rhythm" (Driver, p. 4). As Smoll concluded,

individuals have personal or "natural" preferences of voluntary movement tempo which differ from those of other individuals. This suggests that in situations involving repetitive motor responses to externally imposed rhythmic stimuli, whether in the laboratory or gymnasium or on the playing field, consideration should be given to the tempo at which individual performers prefer to move. (1975a, p. 442)

CHAPTER 3 RESEARCH DESIGN AND PROCEDURES

This chapter describes the pilot study, the research design and procedures, and the test instruments used during the course of the research.

The Pilot Study

The original objectives of this study were to teach third-grade students to keep a steady beat in duple and triple meters and to imitate rhythm patterns. A pilot study was conducted to (a) determine the appropriateness of the tests and (b) begin a series of lesson plans to be used during the treatment phase of the research. The tests in the pilot study were the Response to Meter Test and the Imitation of Rhythmic Patterns Test (Palmer, 1974). The student's task in the Response to Meter Test is to keep a steady beat to music in duple and triple meter. The student's task in the Imitation of Rhythmic Patterns Test is to imitate a one- to two-measure rhythmic pattern. Because these tests were originally designed for fourth-grade students, they were adapted for third-grade students. The Response to Meter test items were changed by using songs from the third-grade level of the Silver-Burdett: Centennial Edition (Crook, Reimer, & Walker, 1985). The rhythm patterns for the Imitation of Rhythmic Patterns Test were

based on lesson objectives in the third-grade Silver-Burdett: Centennial Edition.

The students were quite successful at imitating the rhythm patterns, so the next logical step was to increase the difficulty of the rhythmic patterns by including more complex rhythms and making the patterns longer. These rhythm patterns were based on the Music Aptitude Profile (Gordon, 1965). This version of the Imitation of Rhythmic Patterns was administered to another group of third-grade students. While these more complex items posed a challenge, they were almost impossible to perform at a variety of tempos. The most complex items were too difficult to reproduce at quick tempos, and at slow tempos the relative durations of the note values lost meaning.

Low scores on the Response to Meter Test indicated that the ability to maintain a steady beat is an area in which skill development is lacking. Because the third-grade students had difficulty keeping a steady beat, it was determined that the ability to keep a steady beat would be the objective of the treatment. The Primary Measures of Kinesthetic Response (Froseth, 1987) is a more appropriate measure of the ability to keep a steady beat because it has been demonstrated to be a reliable measure of this skill for students in kindergarten through third grade.

Because Walters found that the effect of personal tempo on synchronization ability is most significant with children in the first grade, Froseth's test was administered to first-grade students during the pilot study. Pilot test

results indicated that the ability to synchronize movement with music at varying tempos was an area in which skill development is lacking at the first- grade level. The lesson objective during the treatment phase of the research became the ability to keep a steady beat, and the Primary Measures of Kinesthetic Response was chosen to measure this skill. With this portion of the pilot completed, the initial lesson plans used in the research study were developed.

Description of the Sample

The subjects who participated in the study were first-grade students drawn from two elementary schools in the north-central Florida area. Fourteen elementary schools within commuting distance were considered potential participants in this study. However, only two schools were able to participate due to limited amounts of space necessary for testing and small group-instruction, inadequate amounts of time scheduled for music class, and recent changes in teaching personnel. Fictitious names are used to designate the two schools.

Two first-grade classes from Derrick Elementary School were able to participate in the experiment. Due to scheduling conflicts with Derrick Elementary, only two first-grade classes were able to participate at Forest Elementary. At each school, the two classes were randomly assigned to either the treatment group or the control group. Therefore, each school contained both an experimental and control group.

The principal of Derrick Elementary gave the final approval to conduct research. Derrick Elementary School is a rural school, where 48 students participated in the study. The control class contained 23 students: 52% were male and 48% were female; 74% percent were black and the remaining 26% were white. The experimental class contained 25 students: 40% were male and 60% were female; 76% were black and 24% were white. Due to transfers, 19 of the control subjects and 21 of the experimental subjects completed the study.

Informed consent was necessary at Forest Elementary. Permission was secured from the university Institutional Review Board, the school district office, and the principal of that school. The students at Forest Elementary School were given a brief explanation of the procedures (see Appendix A). A letter was also sent home to the parent/guardian of each child explaining the testing and treatment procedures. A returned statement of approval signed by the parent/guardian was necessary to participate in the study (see Appendix B).

In the control class 19 of the 23 students returned their permission slips, and 19 of the 22 students in the experimental class returned permission slips. Forest Elementary School was a suburban school. The control and experimental classes consisted of 19 students each. The control class was 53% male and 47% female; 79% of the students in this class were white, 16% black, and 5% other. The students in the experimental class were 47% male and 53%

female; white students made up 84% of the subjects from this class, and the remaining 16% were black. All of the subjects in the control group completed the study (N=19), but only 16 of the experimental subjects completed the study due to transfers.

At the conclusion of the experimental portion of the study, there were 38 subjects in the control group and 37 subjects in the experimental group. Borg and Gall recommend that there be a minimum of 15 subjects in each group to be analyzed (1983, p. 257).

Research Design

Pretest Procedure

Because personal tempo is believed to be a trait that is consistent, more representative measures were obtained by taking four measurements over a period of two weeks. Pretests were administered to individual students over a period of two weeks. During the first week, the children were tested individually on two separate occasions. During the first session personal tempo was measured twice. Two days later a third measure of personal tempo was taken.

During the second week, four to five days later, a fourth measure of personal tempo was taken and Froseth's Primary Measures of Kinesthetic Response was also administered. Because video equipment was not available, the tests were recorded on audiotape. The pretest schedule is outlined fully in Appendix C.

Arranging Small-Group Instruction

Because individual instruction is not usually feasible in music classes, each class was divided into three small groups. After the average personal tempo [PT] of each subject had been calculated, subjects in the two experimental classes were assigned to three small instructional groups, based on their personal tempo: (a) slow personal tempo, $M.M.<80$, (b) moderate personal tempo, $M.M.=80 - M.M.=110$, and (c) fast personal tempo, $M.M.>110$. At Derrick Elementary the subjects in the experimental class were distributed into these groups as follows:

<u>Small Group</u>	<u>Number of Subjects</u>	
	<u>Pretest</u>	<u>Posttest</u>
PT<80	10	8
PT 80 - 110	5	5
PT>110	<u>10</u>	<u>8</u>
	25	21

At Forest Elementary the subjects in the experimental class were distributed into these groups:

<u>Small Group</u>	<u>Number of Subjects</u>	
	<u>Pretest</u>	<u>Posttest</u>
PT<80	7	7
PT 80 - 110	6	4
PT>110	<u>6</u>	<u>5</u>
	19	16

The subjects in the control classes were randomly assigned to one of three instructional groups without regard for personal tempo. At Derrick Elementary the subjects were

randomly assigned to one of three instructional groups as follows:

<u>Number of Subjects</u>		
<u>Small Group</u>	<u>Pretest</u>	<u>Posttest</u>
Group 1	8	7
Group 2	7	5
Group 3	<u>8</u>	<u>7</u>
	23	19

At Forest Elementary School the subjects in the control class were randomly distributed into these groups:

<u>Number of Subjects</u>		
<u>Small Group</u>	<u>Pretest</u>	<u>Posttest</u>
Group 1	8	8
Group 2	6	6
Group 3	<u>5</u>	<u>5</u>
	19	19

Treatment Schedule

The students at Derrick Elementary and Forest Elementary received music instruction on different schedules. As a result, the treatment period for each school was somewhat different. At Derrick Elementary the students met for music two times a week for 30 minutes; therefore, the students completed the 12 units of instruction in six weeks. The students at Forest met one time a week for 45 minutes; therefore, the students completed the 12 units in 12 weeks.

The different class lengths required scheduling the small groups in Derrick Elementary in a different

arrangement from the schedule in Forest Elementary. At Derrick Elementary the researcher taught two small groups during music class, and the music specialist taught one. The third group spent the first part of the music period in the school library. The small groups were rotated so that the researcher and specialist met with each group an equal number of times. This rotation system was also designed to reduce the effects of any experimenter bias. Appendix D outlines the rotation system that was followed at Derrick Elementary.

Because the music period was longer at Forest Elementary School, the researcher was able to teach each small group. To determine if the procedures were followed correctly, three music educators listened to taped lessons and evaluated the teaching of the researcher. A copy of the Bias Report Form is contained in Appendix E.

Treatment Procedures

Each small group met for 12 sessions or units, with each session lasting 10 to 12 minutes. The lessons for the 12 units are presented in Appendix F. The first four lessons were designed to help the subjects understand the term "steady beat," as well as develop their ability to keep a steady beat. A brief emphasis on form as well as steady beat provided variety in these lessons. Lessons 5 through 12 included concepts of meter in addition to steady beat. The following musical concepts were taught:

1. Musical beat can be heard and duplicated.
2. Voices and instruments can produce steady beats.
3. Most music is composed of more than one part.

4. The first beat of a set usually has the biggest sound.
5. Beats can be heard in sets of twos and threes.
(Music K-6, 1974, p. 5)

The lessons included a variety of tasks designed to help students synchronize movements with music. The techniques utilized in these lessons included body rhythms, playing rhythm instruments, chanting, singing, and listening. The ability to keep a steady beat using body rhythms was a prerequisite to using rhythm instruments. Various chants and songs were the vehicles for teaching the concepts and developing skills. Listening was included to enhance the subject's ability to discriminate between steady beat and rhythm, between loud and soft beats, and between duple and triple meter.

Music teachers are not likely to vary the tempo of an activity involving movement. To enhance the generalizability of the results, the subjects in the control groups received instruction at a consistent tempo (approximately ♩ = 100) throughout the treatment. The students in the experimental groups were taught to keep a steady beat at a variety of tempos ranging from 57 beats per minute to 130 beats per minute, which are found in the Primary Measures of Kinesthetic Response (Froese, 1987). Each experimental group began at a tempo at or near the average personal tempo of the group. As the subjects were able to synchronize their movement successfully with music at each tempo, the tempo was increased or decreased. An example of the experimental procedure can be drawn from

an activity in Unit 1 as it was taught at Forest Elementary. The subjects in each of the three experimental groups practiced keeping a steady beat with the rhyme, "Fudge, Fudge." The subjects with slow personal tempos began practicing at 58 beats per minute, which is a tempo within the range of the slow personal tempo group. With practice, the subjects were able to maintain a steady beat at this tempo, so the tempo was increased slightly. As the subjects were able to synchronize at the faster tempo, the speed of the repetitions was increased. During the subsequent repetitions, the tempo was gradually increased to 66 beats per minute.

The subjects with moderate personal tempos began practice at 100 beat per minute. When the subjects were able to successfully maintain a steady beat at this tempo, the tempo was increased. During the remainder of the lesson, the tempo was gradually increased to 116 beats per minute. The subjects with fast personal tempos began to practice keeping a steady beat at 126 beats per minute and gradually decreased speed throughout the repetitions until they reached 112 beats per minute. Metronomes with flashing lights were used to ensure that the correct tempo was used for each group.

During the initial lessons, each group participated in movement activities at speeds spanning the range of the test. The remainder of the lessons were devoted to keeping a steady beat when items with diverse tempos were presented one after the other. Appendix G shows the progress of the

students in the experimental groups through the various tempos.

Posttest Procedures

At the end of the treatment period the subjects in the experimental and control groups were tested individually using Froseth's Primary Measure of Kinesthetic Response.

Data-Gathering Instruments

Test of Personal Tempo

A procedure for measuring the personal tempo of young children (grades K-3) was developed by Walters (1983) for his study of children's ability to synchronize music and movement. In order to discover a method that would result in "measurable natural responses" (.p 47), Walters explored several techniques including selecting a tempo on the metronome, choosing from two tempos heard on a metronome, and having the students perform a tempo using classroom instruments. All of these methods proved unsatisfactory. Walters then concluded that a method was needed that involved "the child's body in a state of relaxation" (p. 48) and the fewest possible distractions. The following procedure was developed that required a cassette recorder, microphone, and stopwatch:

1. Begin the occasion of the measurement with pleasant conversation to relax the subject.
2. Seat the subject in a chair. Explain the presence of the equipment in view and describe generally what is to be done.
3. Have the subject assume a relaxed position with palms down on the thighs. Give the following instructions: "When I ask you to begin, pat your hands on your legs in a steady beat that feels good to you, and keep the beat going until I ask you to stop."

4. Turn on the tape recorder, give the code number for the subject, and signal the subject to begin.
5. Use a stopwatch to time the number of pats occurring in 15 seconds, and multiply by four to obtain a rough measure of personal tempo. . . . A more precise measurement will be taken from the tape for analysis. (pp. 48-49)

Like Rimoldi (1951), Walters cautioned against using the word "speed" during the test. Students who tended to accelerate or decelerate were asked to "make all of your beats alike."

An approximation of the subject's personal tempo can be calculated by counting the number of pats during the 15-second interval and multiplying by four. By taking four measurements over a period of three weeks, Walters obtained a more representative sample of a student's personal tempo. Walters' procedures were used in administering the test in this study. The subject and researcher sat in two chairs approximately four feet apart facing each other. A tape recorder with built-in microphone was placed on a third chair next to the subject.

Using a digital stopwatch with .01 second intervals, more exact measurements of the recordings can be verified using a procedure outlined by Walters (1983):

1. Listen to the first few pats to make possible a synchronization of the stopwatch operation with the pats.
2. Start the watch precisely on a pat and stop it precisely on a pat after 10 to 14 seconds.
3. Divide the number of pats minus one by the time, and multiply by 60 to compute M.M. (p.55)

To test the reliability of this technique, Walters randomly selected one performance from each of three categories: (a) slow, M.M.<80, (b) moderate, M.M.=80 to

M.M.=110, (c) and fast, M.M.>110. Each performance was clocked three times using a Latin square format to avoid bias. The standard deviations of the results were "infinitesimal," (p. 55) and so Walters concluded that the stopwatch technique was capable of being reproduced.

Walters was also concerned that measurements of personal tempo might be unstable due to start-up problems, the subject's loss of attention, or distractions. To investigate this possibility, one of the four tests of personal tempo was randomly selected from sixteen subjects (two male and two female from each grade) who were also randomly chosen. Each performance was divided into approximate thirds of seven to nine seconds in length. The M.M. of each third of the performance and the total performance was calculated. The results indicate that "variability within performance is not a serious problem" (p. 59), but because most of the variability tended to occur in the first and last thirds, it was concluded that the middle 10 seconds would yield the most accurate measurement.

Primary Measures of Kinesthetic Response

This test was developed by Professor James O. Froseth of the University of Michigan. It is a tape-recorded test consisting of 14 short musical selections with tempos ranging from M.M.=57 to M.M.=130. The range of tempos was determined during preliminary studies and by considering tempos likely to be included during musical experiences. The tempo of each item is presented in Table 3-1.

Table 3-1
Tempo of Items in the Primary Measures of
Kinesthetic Response

<u>Item Number</u>	<u>Tempo (M.M.)</u>
1.	104
2.	113
3.	60
4.	90
5.	70
6.	57
7.	85
8.	120
9.	81
10.	96
11.	130
12.	64
13.	103
14.	100

Each item is introduced with three pitches. A woodblock plays the steady beat at the beginning of the selection. Thus, the test measures the student's ability to maintain a steady beat rather than the ability to discern the steady beat. When the woodblock stops, the student is to continue the steady beat by patting his hands on his knees. An example is given at the beginning of the tape and two practice items follow. The test is 8.5 minutes long. Because videotaping equipment was not available at both

schools, two cassette recorders were used to administer the test, one to play the test and the other to record the students' performance. As in the Test of Personal Tempo, a chair for the researcher and a chair for the subjects was placed approximately four feet apart facing each other. One tape-recorder was placed on a third chair next to the subject to record his performance. A second tape-recorder containing the Primary Measures of Kinesthetic Response was placed on a fourth chair next to the researcher. To help the subjects understand the directions, the researcher performed the practice items with each student.

Test results were evaluated by three music educators according to the following criteria:

- 1 - erratic; as if not hearing the music
- 2 - unsynchronous, but exhibiting some sense of the task
- 3 - nearly synchronous, but not "locked in"
- 4 - synchronous; locked into the tempo throughout
- 5 - synchronous; in addition, acknowledging such musical considerations as emphases and phrase endings (Froseth, 1987)

The scores assigned by the three evaluators were averaged together for a final score.

In order to determine the reliability of the test, Walters readministered the test to 16 randomly selected subjects, two male and two female from each grade. The re-tests were conducted in the same manner and then evaluated by the same judges 24 to 72 hours later. To minimize recall, the original performances of these 16 students were randomly mixed into three rating sessions that were spread over three consecutive days.

Test/re-test reliability coefficients were computed for each test item. The correlation between scores on item 8 was significant at the .05 level and the correlations for the remainder of the items were significant at the .01 level. The composite reliability coefficient was .89.

Handwritten notes:
1.3
13.61
12.2

CHAPTER 4 ANALYSIS OF DATA

There were several purposes of the data analysis: (a) to determine if individuals have a consistent personal tempo, (b) to find out if personal tempo influences synchronization ability, and (c) to determine if students are more able to keep a steady beat at a variety of tempos when using their personal tempo as a starting point.

Analysis of Personal Tempo Measurements

The hypothesis for this portion of the study was concerned with the consistency of personal tempo measurements for individuals over time. The personal tempo for each of the 86 subjects in this study was determined by averaging the four measurements of personal tempo taken over a period of two weeks. The average personal tempos of the 86 subjects ranged from 48.59 to 168.17, with a mean average personal tempo of 103.90.

The within-subject variability for each individual subject's personal tempo is indicated by the coefficient of variation [C.V.], which is the percentage of variation among the four measurements of personal tempo. The percentages for each subject's four measurements ranged from 1.89 to 62.3; the mean C.V. for the entire sample was 14.58 %. Table 4-1 shows the distribution of C.V. values for the various groups. The standard deviation between-

subjects was 30.75, and the mean standard deviation within-subjects was 14.23.

Table 4-1
Distribution of the Total Sample in Percentages
According to the Coefficient of Variation

<u>C.V.</u>	<u>N</u>
Less than .07	22
.07 to .17	33
.17 to .27	23
.27 to .37	6
.37 to .47	1
Greater than .47	1

Correlation coefficients were computed to determine if the four measures of personal tempo were reliable throughout the four test administrations. These are presented in Table 4-2. The P-values for the coefficients in the table are significant at the .0001 level.

Table 4-2
Pearson Correlation Coefficients for
Personal Tempo Measurements 1-4

PT 1	1.00			
PT 2	.89	1.00		
PT 3	.70	.68	1.00	
PT 4	.76	.82	.71	1.00
	PT 1	PT 2	PT 3	PT 4

Because the correlation coefficients are quite positive, and because the between-subject variability is much greater than the within-subject variability, the null hypothesis regarding consistency of personal tempo can be rejected. The data indicate that individuals do possess a consistent personal tempo. The personal tempos, coefficients of variation, and the standard deviations for each subject are presented in Appendix H.

The Effect of Personal Tempo on Synchronization Ability

The hypothesis for this portion of the study involved the amount of difference among mean scores on a measure of synchronization ability for those students who were considered as having a fast, slow, and moderate personal tempos as shown in Table 4-3.

Table 4-3
Personal Tempo Groups

<u>Group</u>	<u>Personal Tempo</u>
Slow	M.M.<80
Moderate	M.M.=80 - M.M.=110
Fast	M.M.>110

As just mentioned, the analysis of the data for personal tempo indicates the existence of a between-subjects variability. If personal tempo influences the ability to synchronize movement with music, then it is possible that subjects will be more successful at synchronizing movement with music that is at or near their personal tempo. Furthermore, as the tempo of the music deviates from

personal tempo, it can be hypothesized that synchronization will become more difficult. As a result, synchronization scores could be expected to be highest on test items at or near personal tempo and lower as the tempo of the music deviates from personal tempo.

For example, on the slow test items (M.M.=57 - M.M.=70) subjects with slow personal tempos could be expected to score highest and subjects with fast personal tempos would logically score the lowest. For the fast test items (M.M.=113 - M.M.=130) the opposite could be hypothesized; subjects with fast personal tempos would score the highest and subjects with slow personal tempos would score the lowest.

Analysis of variance was applied to test this hypothesis. To reject the null hypothesis of no significant difference, the synchronization scores for the personal tempo groups on the pretest of the Primary Measures of Kinesthetic Response would need to be significantly different at slow tempos (M.M.=57 - M.M.=70), moderate tempos (M.M.=81 - M.M.=104), and fast tempos (M.M.=113 - M.M.=130). The F-values, levels of significance, and mean scores for the personal tempo groups are presented in Table 4-4.

Although there was a wide range of personal tempos among the subjects in this study (48.59 - 168.17), the data indicate no significant difference among the scores of the personal tempo groups on the slow, fast, or moderate items

on the Primary Measures of Kinesthetic Response. Therefore, the null hypothesis is accepted.

Table 4-4
ANOVA for Personal Tempo Groups for Slow, Fast,
and Moderate Test Items

<u>Test Items</u>	<u>DF</u>	<u>F-Value</u>	<u>P-Value</u>	<u>PT Group</u>	<u>Mean Score</u>	<u>N</u>
Slow	2	2.62	0.0788	Slow	2.8641	25
				Moderate	2.5530	23
				Fast	2.4099	38
Mod.	2	0.28	0.7589	Moderate	3.3484	25
				Slow	3.2839	23
				Fast	3.2059	38
Fast	2	2.13	0.1257	Fast	3.1411	25
				Slow	2.9753	23
				Moderate	2.6969	38

Closer examination of the mean scores, however, reveals tendencies that appear to lend some support to the theory. For the four slowest items (M.M.=57 - M.M.=70), the subjects with slow personal tempos scored the highest, subjects with moderate personal tempos scored second, while subjects with fast personal tempos earned the lowest score. On the items with tempos that range from M.M.=81 to M.M.=104, the subjects with moderate personal tempos scored the highest, followed by subjects with slow personal tempos, and the subjects with the fast personal tempos were third. Students in the fast personal tempo category have the highest mean score beginning on the test items that range in tempo from M.M.=113 to M.M.=130.

For further examination of the scores of the personal tempo groups, a mean score was calculated for the subjects in each personal tempo group for each item of the test. The mean scores for each group can be found in Appendix I.

Results of the Treatment as Measured by the
Primary Measures of Kinesthetic Response

The hypothesis for this portion of the study concerned the differences among the scores on a measure of synchronization ability for those students who received instruction adjusted for their personal tempo and those whose instruction was not modified for personal tempo.

Mean Scores and Measures of Dispersion

Each student's overall synchronization ability was determined by averaging his/her score on the 14 items of the Primary Measures of Kinesthetic Response. The means and standard deviations of the subjects' average synchronization scores are presented in Table 4-5.

Table 4-5
Scores on the Primary Measures of Kinesthetic Response

	Pretest			Posttest		
	N	Mean	SD	N	Mean	SD
Experimental Group	44	2.96	.57	37	3.34	.54
Control Group	42	3.00	.73	38	3.29	.60
Combined Groups	86	2.98	.63	75	3.31	.57

The distribution of pre- and posttest scores for all of the subjects arranged in stem-and-leaf diagrams are presented in Table 4-6. An examination of the stem-and-leaf diagrams representing all of the subjects in the sample reveals some increase in scores on the posttest for all subjects who participated in the study. Fifty-one percent of the subjects scored between 3.0 and 3.9 on the pretest and 72 % of the subjects scored within that range on the posttest. The percentage of students scoring in the 3.5 to 3.9 range increased from 23.2 to 48. The percentage of students scoring less than a 3.00 on the pretest decreased by 22 percent on the posttest. The stem-and-leaf diagrams of the control and experimental groups reveal a similar change in scores from the pretest to the posttest.

These descriptive data indicate that at the time of the pretest the majority of the students were able to synchronize their movement with music at various tempos, but they lacked consistency in doing so. Only a few students were unable to perform the synchronizaton task at all, and only a very few were considered consistently synchronous. These data also indicate that there was some increase in the ability to synchronize movement with music over the period of the study.

Evaluation by Judges

Three music educators evaluated each subject's performance on the Primary Measures of Kinesthetic Response. Their ratings served as the dependent variable for this portion of the study. The effect of the treatment was then

Table 4-6
Distribution of Mean Scores on the Primary Measures of
Kinesthetic Response

Pretest Scores for All Subjects (N=86)

	N
4 00001	5
3 55555555667777778999	20
3 001111112222333333334444	24
2 566777778889999999	17
2 000000123334444	15
1 68899	5

Mean Posttest Scores for All Subjects (N=75)

	N
4 11223	5
3 55555555555555666666667777888889999	36
3 0011111122333444444	18
2 6667779999	10
2 04	2
1 7788	4

Mean Pretest Scores for the Control Subjects (N=42)

	N
4 01	2
3 566777	6
3 00111112233334	14
2 677889999	9
2 0013344	7
1 6889	4

Mean Posttest Scores for the Control Subjects (N=38)

	N
4 11	2
3 555555566666778899	18
3 112234444	9
2 667799	6
2 4	1
1 77	2

Table 4-6--Continued

Mean Pretest Scores for the Experimental Subjects (N=44)

	N
4 000	3
3 55555557778999	14
3 1223333444	10
2 56777899	8
2 00002344	8
1 9	1

Mean Posttest Scores for the Experimental Subjects (N=37)

	N
4 223	3
3 555555566667788899	18
3 001113344	9
2 6799	4
2 0	1
1 88	2

assessed using repeated measures analysis of variance [ANOVA]. For each subject, the scores of the three judges were pooled together to obtain measures of synchronization ability at the time of the pretest and at the time of the posttest. Mean pretest and posttest scores were then calculated for both the control and experimental groups.

Repeated measures ANOVA was used to determine (1) if there were a significant difference between the experimental group and the control group (referred to as "Group" in Table 4-7), (2) if there were a significant difference from pretest to posttest (referred to as "Time" in Table 4-7); and (3) if one group improved significantly over the other as a result of the treatment (referred to as "Time X Group" in Table 4-

7). The results of the Repeated Measures ANOVA are shown in Table 4-7.

Table 4-7
Repeated Measures Anova of the Mean
Synchronization Scores

	<u>DF</u>	<u>F-Value</u>	<u>P-Value</u>
Time X Group	1	0.01	0.9047
Group	1	0.12	0.7261
Time	1	29.58	0.0001

Although the mean scores found in Table 4-5 indicate that both the experimental and the control groups improved from pretest to posttest, the results of the repeated measures ANOVA indicate that one group did not improve significantly more than the other. Therefore, the null hypothesis is accepted. In addition, no difference was found between the control and experimental groups. However, the difference between pretest and posttest scores for the groups was found to be significant at the .0001 level, indicating an improvement, probably due to musical maturation and practice.

Interscorer Reliability of the Primary Measures
of Kinesthetic Response

The judges of the Primary Measures of Kinesthetic Response were instructed on scoring procedures and scoring criteria. The average inter-item correlation among the three judges over the subjects was calculated using Cronbachs's coefficient alpha, a test used when items are not scored dichotomously. The reliabilities for each item

of the pretest and posttest are presented in Appendix J. The reliabilites of the pretest items range from .7689 to .9332, while the reliabilities of the posttest range from .7915 to .9086. The mean pretest reliability is .8600, and the mean posttest reliability is .8800

Results of the Bias Report Form

Three units of instruction were randomly selected to be tape-recorded for evaluation by three music educators using the Bias Report Form. (See Appendix E) Each of the judges evaluated the three units. Prior to their evaluation of the tapes, the judges were given copies of the lesson plans and instructed on the use of the form. They were also reminded that they were evaluating the tempos of the activities involving movement and the accuracy of the instructor with regard to following the lesson plans, not the students' performance. To analyze the results of the three judges, each of the circled statements was converted to a numerical value as follows: Strongly Agree was assigned a value of 5; Agree was assigned a value of 4; Neither Agree or Disagree a value of 3; Disagree a value of 2; and Strongly Disagree was assigned a value of 1. The scores assigned by the three judges are presented in Table 4-8.

The mean scores for each of the statements ranged from 4 to 5, with a the mean value of 4.68. These results indicate that the researcher followed the lesson plans and used proper procedure with regard to tempo. Further discussion of the results and the implications of these

findings for the teaching of music are presented in Chapter 5.

Table 4-8
Results of the Bias Report Form

		<u>Judge 1</u>	<u>Judge 2</u>	<u>Judge 3</u>	<u>AVG</u>
<u>Unit 5</u>	1.	5	5	5	5
	2.	4	4	4	4
	3.	4	5	5	4.66
	4.	4	4	5	4.33
<u>Unit 8</u>	1.	5	5	5	5
	2.	4	5	5	4.66
	3.	5	5	5	5
	4.	4	4	5	4.33
<u>Unit 9</u>	1.	5	5	5	5
	2.	4	5	5	4.66
	3.	5	5	5	5
	4.	4	5	5	4.66
					AVG 4.48

CHAPTER 5
SUMMARY, CONCLUSIONS, AND RECOMMENDATIONS

The foundation of rhythm in most Western music is the steady beat. In order for first grade children to understand the more complex elements of rhythm such as meter and rhythm patterns, they must develop a sense of steady beat. Not all children, however, are equally capable of maintaining a steady beat. A possible explanation for this inequity is the phenomenon of personal tempo.

Summary

Personal Tempo

The first objective of this study was to determine if each of the first-grade students in this sample (N=86) had a consistent personal tempo. A null hypothesis was posited that no consistency of personal tempo exists for children over a period of time. To test this hypothesis, four measurements of personal tempo were taken over a period of two weeks.

The mean personal tempos of the 86 subjects ranged from 48.59 to 168.17. The standard deviation was 30.75, and the mean standard deviation within-subjects was 14.23. Correlation coefficients for the personal tempo measurements ranged from .68 to .89 and were high enough to suggest consistency over time. Because the evidence suggests the

existence of personal tempo, the null hypothesis was rejected.

The Influence of Personal Tempo on Synchronization Ability

Previous research (Walters, 1983) has also indicated that subjects are more successful at synchronizing their movement with music if the tempo of the music is at or near their own personal tempo. Therefore, the second objective of this study was to determine if personal tempo affects first-grade students' abilities to synchronize movement with the beat at a variety of tempos. The null hypothesis was posited that no significant difference exists among mean scores on a measure of synchronization ability for those students with fast, slow, and moderate personal tempos.

The subjects' synchronization abilities were measured using their pretest scores on the Primary Measures of Kinesthetic Response. This test contains 14 test items ranging in tempos from M.M.=57 to M.M.=130. Each of the 86 subjects was assigned to one of three personal tempo groups: slow, M.M.<80; moderate, M.M.=80 to M.M.=110; and fast, M.M.>110.

ANOVA was used to determine if the mean synchronization scores of the personal tempo groups differed significantly on the slow items (M.M.=57 - M.M.=70), moderate items (M.M.=81 - M.M.=104), and the fast items (M.M.=113 - M.M.=130) of the Primary Measures of Kinesthetic Response. The results indicated that the scores of the three personal tempo groups were not significantly different. Therefore, the null hypothesis could not be rejected.

Further analysis of the personal tempo groups' mean scores revealed that on the slow items the subjects in the slow personal tempo group scored the highest, subjects with moderate tempos ranked second, and subjects with fast personal tempos ranked third. Subjects with moderate personal tempos scored the highest on the test items with more moderate tempos. Subjects with fast personal tempos ranked first on the test items with the fastest tempos. While these rankings are interesting to note, none of them were significant at the .05 level.

Results of the Treatment as Measured by the Primary Measures of Kinesthetic Response

The null hypothesis for this portion of the study was that no significant difference exists between the scores on a measure of synchronization ability for those students who received instruction adjusted for their personal tempo and students whose instruction was not adjusted according to their personal tempo.

Classes from each of two schools were randomly assigned to the control group (N=38) or the experimental group (N=37). Because it is not practical to teach each child individually in school music classes, the subjects were divided into small groups. The subjects in each control class were randomly assigned to one of three small groups for instruction, and the subjects in each experimental class were assigned to one of three small groups based on personal tempo.

All of the small groups received 12 units of instruction designed to teach students about steady beat. Each lesson lasted 10-12 minutes and involved movement, playing instruments, chanting, singing, and listening. Subjects in the control groups received instruction at a consistent tempo (M.M.=100). Subjects in the experimental groups received the same instruction, but the first activities using movement were done at a tempo within the personal tempo category of the subjects. The tempos were then gradually expanded to include the entire range of tempos included in the Primary Measures of Kinesthetic Response.

The results of the repeated measures ANOVA indicate that the experimental and control groups improved significantly from the pretest to the posttest. The analysis also indicates that the experimental group did not improve significantly over the control group. Therefore, the null hypothesis was accepted.

Results of the Interscorer Reliabilities and the Bias Report Form

Interscorer Reliability

Three music educators evaluated each subject's performance on the Primary Measures of Kinesthetic Response. The inter-item correlation between the three judges over all the subjects was calculated for each item of the test using Cronbach's coefficient alpha. The mean pretest reliability was .8600 and the mean posttest reliability was .8800.

Bias Report Form

This form was constructed to examine the procedures used by the researcher during the treatment phase of the research. Three units of instruction were randomly selected to be tape-recorded for evaluation by three music educators. Each of the three judges was given a copy of the lesson plans and instructed on the use of the form. The judges evaluated the researcher with regard to following the lesson plans and the use of tempo during instruction. The results indicated that the researcher followed the stated procedures during the treatment.

Conclusions

Consistency of Personal Tempo

Previous research in the area of personal tempo has been conducted primarily with adult subjects. All of these studies (Frischeisen-Kohler, 1933; Allport and Vernon, 1933; Harrison and Dorcus, 1938; Harrison, 1941; Rimoldi, 1951; Smoll, 1975a and 1975b; and Smoll and Schultz, 1978) have concluded that adult subjects have a personal tempo that is consistent. The results of Walters' (1983) study of personal tempo indicated that children in kindergarten through third grade have a personal tempo. Based on the results of this study, it may be concluded that first-grade students have a personal tempo that is consistent. These results concur with Walters (1983) and provide a useful replication for an age group where little research has been conducted.

Personal Tempo and Synchronization Ability

The wide range of personal tempos in the sample and the lack of significant difference between the personal tempo groups on the slow, moderate, and fast items of the Primary Measures of Kinesthetic Response indicate that personal tempo does not effect the ability to synchronize movement with music at the first grade level. While the rank order of the mean scores obtained in this study is similar to those obtained in Walters' (1983) study, Walters based his conclusion that personal tempo effects synchronization ability on the results of mean scores. He does not indicate whether or not the mean scores are significantly different.

Due to the lack of significant differences in the scores, it is questionable whether or not the rank order of personal tempo categories is truly indicative of a relationship between personal tempo and synchronization ability.

Results of the Treatment

The results suggest that beginning instruction around students' personal tempos and gradually expanding the range of tempos does not facilitate synchronization skills. Therefore, if children are experienced at synchronizing their movement with music at a consistent tempo, they will be able to synchronize their movement with music at other tempos. This finding does not support Abramson (1986) who stated that "the ability to perform in one tempo does not automatically give the ability to deal with many tempi. . . . Staying too long in one tempo can give rise to . . . the

inability to use the body and mind in a new tempo when called upon to do so" (p. 202). The increase in scores from the pretest to the posttest was probably due to musical maturation and practice. Earlier studies (Williams, Sievers, and Hattwick, 1932; Jersild and Bienstock, 1935; and Walters, 1983) all cited maturation as one reason for increased synchronization ability.

Discussion of Research Procedures

The unavailability of video equipment made it necessary to record the subjects pre- and posttests on audio tape. Had video equipment been available, the tests could have been evaluated in a more sensitive manner. This is most significant in determining if a student should be given a "4" for being synchronous throughout or a "5" for acknowledging emphases and phrase endings as well as being synchronous.

Implications for Teaching

An understanding of how children learn is vital for teachers to determine what teaching techniques are most effective. Research in the area of rhythmic instruction can provide teachers with information that can assist them in deciding on activities. Sometimes research results are inconsistent with practice and beliefs, although the findings of one study can neither fully support nor reject a teaching practice. Each study has its own limitations with respect to design and method.

The significant increase in posttest scores for the control group in this study suggest that if children are

taught at a consistent tempo, they will, with practice, be able to synchronize their movement with a variety of tempos. Maturation can be facilitated through instruction that provides children with opportunities to develop both their perceptual and performance skills. This is especially important for young children whose musical aptitude has not yet stabilized. Joseph (1983) and Moore (1984) also found that rhythm skills, concepts, and aptitude can be enhanced by including a variety of listening and performing experiences within each music class.

It was observed during the course of this study, as well as in studies by Thackray (1969, 1972), that children often confuse steady beat with the rhythmic pattern of the notes. Many repetitions were needed for some children to be able to discriminate aurally between steady beat and the rhythm pattern of the notes. To add variety to lessons, the concept of steady beat can be practiced in combination with other concepts such as timbre and form. As Moore (1984) commented in her study, teachers need to provide students with many opportunities to hear others perform steady beats and to experience the steady beat of chants and songs through body rhythms and classroom instruments.

Suggestions for Further Research

Because of the limited amount of research in the area of synchronization ability, personal tempo, and how personal tempo affects students' abilities to learn about rhythm, several possibilities exist for further research. The following suggestions are offered:

a) Similar studies can be conducted at different age levels. Increased synchronization scores of older subjects on a posttest may be a more valid assessment of the treatment than of maturation, and these studies may also provide information on how synchronization ability changes with maturation.

b) The results of this study are limited to nonlocomotor movements. A design similar to this study could be employed using locomotor movements like walking to the music.

c) In this study the students in the control groups were taught to keep a steady beat at a single tempo, which is what is normally taught in music classes at the elementary school level. In a similar study, the students in the control groups could be taught to synchronize movement at a variety of tempos, with the order of tempos randomly selected.

d) Ethnographic research techniques could be used to determine the different ways in which children are taught to maintain a steady beat and to identify those techniques that appear to be effective in teaching synchronization ability.

e) One of the purposes of this study was to determine if students are more able to keep a steady beat at a variety of tempos when using their personal tempo as a starting point. Studies could be conducted to determine if instruction that is centered around personal tempo would be beneficial for specific subgroups, such as subjects with poor synchronization skills; slow, moderate, or fast

personal tempos; and consistent or inconsistent personal tempos.

f) Correlational studies could determine the best predictor of synchronization ability: personal tempo, intelligence, prior musical experience, maturation, or motor skills.

APPENDIX A
STUDENT CONSENT

The following explanation was given to each class:

"My name is Mrs. Nelson. I go to school at the University of Florida. I am doing an experiment to learn how first grade boys and girls learn about rhythm in music and I need your help.

First, I will play some music and you will keep time with the music by patting your hands on your knees. You will do this all by yourself. I will record what you do on a tape recorder so that I can listen to it later. Then I will be visiting you in Ms. Terrell's music class for a few weeks. We will be singing, moving to the music, and playing instruments. After we do this for a few weeks, I will play some music and you will keep time with the music - just like the first time.

Your teacher will give you a letter like this (show a copy to the class). The letter explains our experiment to your parents. Be sure that your parents see the letter so that they can sign it at the bottom (show class) and you can bring it back tomorrow. We will begin our experiment when the slips are returned to your teacher. Do you have any questions?" As each child enters the room for pretesting he/she will be asked if he wants to participate.

APPENDIX B
PARENTAL CONSENT

Dear Parents,

I am a Ph.D. candidate in music education at the University of Florida. Your child's principal and teachers have graciously agreed to assist me with my graduate research project. I am going to be studying how children learn about rhythm. During the first two weeks of the study, a series of three brief tests, totaling 30 minutes in length, will be given to each child individually. The testing sessions will be arranged as follows:

Week 1. Day 1. This will consist of two measures of personal tempo in which each child pats his/her hands on the lap for 15 seconds at a tempo which feels comfortable.

Week 1. Day 2. This will consist of a third measure of personal tempo.

Week 2. This will consist of the fourth measure of personal tempo and a test of synchronization ability in which each child pats his/her hands on the lap while listening to music of different tempos. These two tests will take 15 minutes.

Your child's performance on these tests will be audio-recorded. Two music educators will assist me in the evaluation of these tapes. At the conclusion of the study the recordings will be completely erased.

During the next twelve weeks I will be working with the first grade children during music class. We will be doing a variety of activities in which your child will be singing, moving to music, and playing instruments in small groups. At the end of the twelve weeks, each child will repeat the synchronization test. Test results will be confidential; a code will be used to report results in the study. Furthermore, test results will not affect school grades. All of the children involved will have opportunity to enhance their skills. I sincerely believe it will be a positive experience for all involved.

Feel free to call me at home if you have any questions or reservations; my number is 336-1307. If at any time your child does not wish to participate in the study he or she is free to withdraw. Should this happen, send me a brief note advising me that your child no longer wishes to participate.

Furthermore, any such decision will not affect school grades. There will be no monetary compensation for participation in the study.

If you do not object to your child's participation, please sign the permission slip below and return it to your child's first grade teacher.

Your cooperation is greatly appreciated. I am looking forward to working with your child.

Sincerely,

Diane Nelson

(Detach Here)

I have read and I understand the procedure described above.

I agree that _____ may participate
(Students' Name)

in Diane Nelson's study of personal tempo.

APPENDIX C
PRETEST AND POSTTEST SCHEDULE

Pretest Schedule:

Week 1. Tuesday.	Class A.	Two measures of personal tempo. 10 minutes for each child.
	Wednesday. Class B.	Two measures of personal tempo. 10 minutes for each child.
	Thursday. Class A.	One measure of personal tempo. 5 minutes for each child.
	Friday. Class B.	One measure of personal tempo. 5 minutes for each child.
Week 2. Monday.	Class A.	One measure of personal tempo and synchronization test for half of the class. 15 minutes for each child.
	Tuesday. Class A.	One measure of personal tempo and synchronization test for the remainder of the class. 15 minutes for each child.
	Wednesday. Class B.	One measure of personal tempo and synchronization test for half of the class. 15 minute for each child.
	Thursday. Class B.	One measure of personal tempo and synchronization test for the remainder of the class. 15 minutes for each child.
	Friday.	A and B. Make-up day.

Total amount of time per child: 30 minutes.

Posttest Schedule

Monday. Class A. Test of synchronization for half of the class. 15 minutes for each child.

Tuesday. Class A. Test of synchronization for the remainder of the class. 15 minutes for each child.

Wednesday. Class B. Test of synchronization for half of the class. 15 minutes for each child.

Thursday. Class B. Test of synchronization for the remainder of the class. 15 minutes for each child.

APPENDIX D
ROTATION SCHEDULE

	Researcher	Music Teacher	Media Center
Session I	1 2	3	2
Session II	3 2	1	2
Session III	1 3	2	3
Session IV	2 3	1	3
Session V	2 1	3	1
Session VI	3 1	2	1
Session VII	1 2	3	2
Session VIII	3 2	1	2
Session IX	1 3	2	3
Session X	2 3	1	3
Session XI	2 1	3	1
Session XII	3 1	2	1

APPENDIX E
BIAS REPORT FORM

Circle the appropriate response following each statement.

Experimental Groups

1. The researcher followed the lesson plan.

SA - Strongly Agree
A - Agree
N - Neither agree or disagree
D - Disagree
SD - Strongly Disagree

2. The tempos of the activities were varied.

SA - Strongly Agree
A - Agree
N - Neither agree or disagree
D - Disagree
SD - Strongly Disagree

Control Groups

3. The researcher followed to lesson plan.

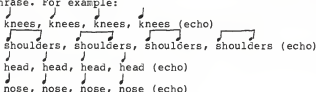
SA - Strongly Agree
A - Agree
N - Neither agree or disagree
D - Disagree
SD - Strongly Disagree

4. The tempo of the various activities was consistent throughout the lessons.

SA - Strongly Agree
A - Agree
N - Neither agree or disagree
D - Disagree
SD - Strongly Disagree

APPENDIX F
UNITS OF INSTRUCTION

Unit 1

- I. Activities: speech, body rhythms, singing
- II. Sources: "Fudge, Fudge" Music for Children: Orff-Schulwerk American Edition. Vol. 2. (1977). page 7.
"Old Dan Tucker" Silver Burdett: Centennial Edition. (1985). Grade 3; Teacher's Edition. page 15.
- III. Concept:
A. Concept Area: rhythm
B. Concept Sentences: (1) Musical beat can be heard and duplicated.
- IV. Materials Needed: Metronome with light only.
- V. Teaching Procedure:
1. Warm-up. The teacher speaks the names of body parts in rhythm and students echo at the end of each phrase. For example:


knees, knees, knees, knees (echo)
shoulders, shoulders, shoulders, shoulders (echo)
head, head, head, head (echo)
nose, nose, nose, nose (echo)
 2. Vary names of body parts for more practice.
 3. Teacher chants names of body parts in rhythm and accompanies by patting a steady beat on the part of the body being named. Students echo and copy motions.
 4. Vary names and order of body parts for more practice. Continue to keep a steady beat by tapping the part of the body being named.
 5. Introduce "Fudge, Fudge." Recite completely and then recite each line and having the students echo.
 6. The teacher chants a line and accompanies by patting a different part of the body. Students echo each line and copy the teacher's motions.
 7. Vary parts of the body for more practice.
 8. Introduce "Old Dan Tucker" by singing the complete song and then having students echo each phrase after it is sung by the teacher.

Unit II

I. Activities: speech, playing instruments, singing, body rhythms

II. Sources: "Fudge, Fudge" and "Old Dan Tucker"

III. Concept:

A: Concept Area: rhythm

B: Concept Sentences: (1) Musical beat can be heard and duplicated. (2) Voices and instruments can produce steady beats.

IV. Materials Needed: Metronome with light only. Rhythm sticks.

V. Teaching Procedure:

1. Warm-up. Review words to "Fudge, Fudge"
2. Recite "Fudge, Fudge" by phrases and accompany each phrase with a steady beat using different body rhythms. The group will echo each phrase and imitate the body rhythm used by the teacher.
3. Using rhythm sticks, have the group keep a steady beat as they echo each phrase.
4. Recite the rhyme without echoing each phrase and keep a steady beat with the instruments.
5. Review "Old Dan Tucker."
6. Sing "Old Dan Tucker" in phrases and accompany with body rhythms. The students will echo each phrase and copy the body rhythms used by the teacher.

Unit III

- I. Activities: body rhythms, singing, speech
- II. Sources: "Old Dan Tucker" and "Two, Four, Six, Eight" Music for Children: Orff-Schulwerk American Edition. Vol. 2. (1977). p. 104.
- III. Concept:
 - A: Concept Areas: rhythm and form.
 - B: Concept Sentences: (1) Musical beat can be heard and duplicated. (2) Most music is composed of more than one part.
- IV. Materials Needed: Metronome with light only.
- V. Teaching Procedure:
 - 1. Warm-up. Review "Old Dan Tucker." If necessary, sing in phrases first and then the complete song.
 - 2. Sing the song and use body rhythms to keep a steady beat.
 - 3. Note to the class that there are two parts to the song. Ask the class if someone can identify the two parts.
 - 4. Have the group sing the entire song and accompany with different body rhythms for each half.
 - 5. Divide the group in half. The first half sings and accompanies themselves using a body rhythm. The other half sings the chorus and accompanies themselves using a different body rhythm.
 - 6. Introduce "Two, Four, Six, Eight" by reciting the rhyme completely and then having the group echo each line.

Unit IV

- I. Activities: speech, listening, body rhythms
- II. Sources: "Two, Four, Six, Eight" and "Old Dan Tucker"
- III. Concept:
 - A. Concept Areas: rhythm
 - B. Concept Sentence: Musical beat can be heard and duplicated.
 - C. Verbal Symbol: steady beat
- IV. Materials Needed: Metronome with light only. One pair of rhythm sticks for the teacher.
- V. Teaching Procedures:
 1. Warm-up. Recite "Two, Four, Six, Eight" by echoing phrases first and then reciting the complete poem.
 2. Tell the students to listen to the sticks.
 3. The teacher recites "Two, Four, Six, Eight" and accompanies with rhythm sticks, keeping a steady beat.
 4. Ask the students if the sticks got slower, faster, or stayed the same. Repeat the rhyme and steady beat as necessary.
 5. Point out that this is a steady beat.
 6. Have the group recite the poem and keep the steady beat.
 7. Again, tell the students to listen while you play. Have them listen to see if what you are going to do is the same or different from the steady beat.
 8. Recite the poem again and this time play the rhythm of the words.
 9. Call for an individual who can identify what is different.
 10. Have the group recite the rhyme and clap the rhythm of the words. Note to the students that this is not the steady beat.
 11. Remind the students that music has a steady beat. Have the group sing "Old Dan Tucker" and keep a steady beat using body rhythms.

Unit V

- I. Activities: listening, speech, body rhythms, singing.
- II. Sources: "Old Dan Tucker" and "Fudge, Fudge" and "Michael Finnegan" Integrating Music into the Classroom by W. M. Anderson and J. E. Lawrence. Published by Wadsworth (1985); Belmont, CA. page 25.
- III. Concept:
 - A: Concept Area: rhythm
 - B: Concept Sentences: (1) Musical beat can be heard and duplicated. (2) Beats can be heard in sets of twos and threes. (3) The first beat of a set usually has the biggest sound.
 - C: Verbal Symbol: steady beat, strong beat, weak beat
- IV. Materials Needed: Metronome with light only.
- V. Teaching Procedure:
 1. Warm-up. Have the students listen to the beats to see if they are all the same.
 2. Using patschen, the teacher recites "Fudge, Fudge" and keeps a steady beat and emphasizes strong and weak beats.
 3. Ask probing questions, for instance - Were the beats steady? Were all of the beats were same? How were they different? Were some louder than others? Was there a pattern?
 4. Have the class perform the "LOUD - soft" pattern using the same motions. Practice until they are comfortable with the motions. Saying "Loud" in a strong speaking voice and "soft" in a quiet speaking voice may help them.
 5. Have the group recite "Fudge, Fudge" and indicate the strong and weak beats.
 6. Music also has strong and weak beats. sing "Old Dan Tucker" and indicate strong and weak beats.
 7. Introduce the song "Michael Finnegan."

Unit VI

- I. Activities: listening, body rhythms, singing.
- II. Sources: "Michael Finnegan" and "Did You Ever See a Lassie." Integrating Music into the Classroom by W. M. Anderson and J. E. Lawrence. Published by Wadsworth (1985); Belmont, CA. pages 25 and 210.
- III. Concept:
- A: Concept Area: rhythm
 - B: Concept Sentences: (1) Musical beat can be heard and duplicated. (2) Beats can be heard in sets of twos and threes. (3) The first beat of a set usually has the biggest sound.
 - C: Verbal Symbol: steady beat, strong beat, weak beat
- IV. Materials Needed: Metronome with light only, one (1) rhythm instrument for the teacher, cassette recorder, and recordings.
- The recordings are to be at specific tempos. For the control groups there should be one recording of "Michael Finnegan" at $\text{♩} = 100$. For the experimental groups there should be three recordings at the following tempos:
 $\text{♩} = 76$; $\text{♩} = 88$, and $\text{♩} = 100$.
- V. Teaching Procedure:
1. Warm-up. Review "Michael Finnegan."
 2. Ask the students to listen to the following - the teacher sings "Michael Finnegan" and plays the rhythm on the rhythm instrument.
 3. Ask the class if the teacher played a steady beat.
 4. Have the class listen again. The teacher sings the same song but this time plays a steady beat and emphasizes the strong and weak beats. Ask the students questions about what they heard, such as: Was the beat steady? Were some beats louder than others?
 5. Play the recording of "Michael Finnegan." On the recording a woodblock will keep a steady beat and emphasize the strong and weak beats. The students should do the same by patting their hands on their knees.
 6. Continue to use body rhythms during the subsequent recording(s) of "Michael Finnegan" that follow. For the experimental groups, each recording is at a different tempo.
 7. Introduce or review "Did You Ever See a Lassie."

Unit VII

- I. Activities: listening, body rhythms, singing, speech
- II. Sources: "Did You Ever See a Lassie."
- III. Concept:
- A: Concept Area: rhythm
 - B: Concept Sentences: (1) Musical beat can be heard and duplicated. (2) Beats can be heard in sets of twos and threes. (3) The first beat of a set usually has the biggest sound.
 - C: Verbal Symbol: steady beat, strong beat, weak beat
- IV. Materials Needed: Metronome with light only.
- V. Teaching Procedure:
1. Warm-up. Have the group sing "Did You Ever See a Lassie"
 2. Have the group listen to the following. The teacher sings "Did You Ever See a Lassie" and keeps a steady beat and emphasizes strong and weak beats by patting the knees.
 3. The teacher asks the students about what they heard, for example: Were the beats steady? Were all of the beats the same? Were some beats louder than others? Was there a patterns? How is it different from "LOUD - soft."
 4. Have the group perform the "LOUD-soft-soft" pattern as before. Practice until they are comfortable with the motions. As before speaking "LOUD-soft-soft" may help.
 5. Practice keeping the "LOUD-soft-soft" pattern while singing "Did You Ever See a Lassie."

Unit VIII

- I. Activities: listening, body rhythms, singing.
- II. Sources: "Michael Finnegan" and "Did You Ever See a Lassie."
- III. Concept:
 - A: Concept Area: rhythm
 - B: Concept Sentences: (1) Musical beat can be heard and duplicated. (2) Beats can be heard in sets of twos and threes. (3) The first beat of a set usually has the biggest sound.
 - C: Verbal Symbol: steady beat, strong beat, weak beat
- IV. Materials Needed: Metronome with light only. one (1) rhythm instrument for the teacher, cassette recorder, and recordings.
 The recordings are to be done at specific tempos. For the control group there will be one recording of "Did You Ever See a Lassie" at ♩ = 100. For the experimental group, there will be three recordings of the song at the following tempos: ♩ = 100; ♩ = 88; and ♩ = 112.
- V. Teaching Procedure:
 1. Warm-up. Review "Did You Ever See a Lassie."
 2. Ask the students to listen to the following - the teacher sings "Did You Ever See a Lassie" and plays the rhythm on the rhythm instrument.
 3. Ask the class if the teacher played a steady beat.
 4. Have the class listen again. The teacher sings the same song but this time plays a steady beat and emphasizes the strong and weak beats. Ask the students questions about what they heard, such as: Was the beat steady? Were some beats louder than others? How was it different from the "LOUD - soft" in "Michael Finnegan"? (Review if necessary.)
 5. Play the recording of "Did You Ever See a Lassie." On the recording a woodblock will keep a steady beat and emphasize the strong and weak beats. The students should do the same by patting their hands on their knees or clapping.
 6. Continue to use body rhythms during the recordings of "Did You Ever See a Lassie" that follow. For the experimental group, each recording is at a different tempo.

Unit IX

- I. Activities: listening, body rhythms, speech
- II. Sources "Fudge Fudge" and the following songs from Teaching Music in the Elementary Classroom (1982) by Hoffer and Hoffer: "Jump Down, Turn Around," p. 13; "The Bus," p. 93; "Are You Sleeping," p. 96; "Eency, Weency, Spider," p. 100.
- III. Concept:
 - A: Concept Area: rhythm
 - B: Concept Sentences: (1) Musical beat can be heard and duplicated. (2) Beats can be heard in sets of twos and threes. (3) The first beat of a set usually has the biggest sound.
 - C: Verbal Symbol: steady beat, strong beat, weak beat
- IV. Materials Needed: Cassette recorder, recordings of songs from Teaching Music in the Elementary Classroom at specific tempos. For the control groups each song will be recorded a ♩ = 100. Tempos for the experimental groups will be as follows: "Jump Down, Turn Around," ♩ = 120; "The Bus," ♩ = 132; "Are You Sleeping," ♩ = 76; and "Eency, Weency, Spider," ♩ = 69.
- V. Teaching Procedure:
 1. Warm-up. Have the group recite "Fudge Fudge."
 2. Have the group listen to the following. The teacher recites "Fudge Fudge" and claps the rhythm.
 3. The teacher asks the group if they heard a steady beat.
 4. The teacher recites "Fudge Fudge" and keeps a steady beat and emphasizing strong and weak beats.
 5. The teacher asks the students about what they heard, for example: Were the beats steady? Were all of the beats the same? Were some beats louder than others? Was there a pattern?
 6. Play the recordings of the songs. The students should keep a steady beat using patschen or hand clapping. Allow the students to do this with as little help as possible from the teacher. Have students emphasize strong and weak beats if possible.

UNIT X

- I. Activities listening, playing instruments, speech
- II. Sources "Two, Four, Six, Eight" and the following songs from Teaching Music in the Elementary Classroom (1982) by Hoffer and Hoffer: "Los Pollitos," p. 126; "Sandy Land," p. 166; "Git Along Little Doggies," p. 203; "When the Saints Go Marching In," p. 254.
- III. Concept:
 - A: Concept Area: rhythm
 - B: Concept Sentences: (1) Musical beat can be heard and duplicated. (2) Beats can be heard in sets of twos and threes. (3) The first beat of a set usually has the biggest sound.
 - C: Verbal Symbol: steady beat, strong beat, weak beat
- IV. Materials Needed: Cassette recorder, classroom instruments, and recordings of songs from Teaching Music in the Elementary Classroom, at specific tempos. For the control group "Git Along Little Doggies" will be recorded at ♩ = 100. The remainder of the songs will be recorded at ♩ = 100. Tempos for the experimental group will be as follows: "Los Pollitos, ♩ = 100; "Sandy Land," ♩ = 63; "Git Along Little Doggies, ♩ = 58; and "When the Saints Go Marching In, ♩ = 108.
- V. Teaching Procedure:
 1. Warm-up. Have the group recite "Two, Four, Six, Eight."
 2. Have the group listen to the following. The teacher recites "Two, Four, Six, Eight" and claps the rhythm.
 3. The teacher asks the group if they heard a steady beat.
 4. The teacher recites "Two, Four, Six, Eight" and keeps a steady beat, emphasizing strong and weak beats.
 5. The teacher asks the students about what they heard, for example: Were the beats steady? Were all of the beats the same? Were some beats louder than others? Was there a pattern?
 6. Play the recordings of the songs. The students should keep a steady beat using classroom instruments. Allow the students to do this with as little help as possible from the teacher. Have students emphasize strong and weak beats if possible.

UNIT XI

I. Activities: listening, playing instruments, speech

II. Sources: "Old Dan Tucker" and the following songs from Teaching Music in the Elementary Classroom (1982) by Hoffer and Hoffer: "All Night, All Day" p. 57; "If You're Happy," p. 98; "A Tisket, A Tasket" p. 134; "Wonderful Copenhagen," p. 164.

III. Concept:

A: Concept Area: rhythm

B: Concept Sentences: (1) Musical beat can be heard and duplicated. (2) Beats can be heard in sets of twos and threes. (3) The first beat of a set usually has the biggest sound.

C: Verbal Symbol: steady beat, strong beat, weak beat

IV. Materials Needed: Cassette recorder, classroom instruments, and recordings of songs from Teaching Music in the Elementary Classroom at specific tempos. For the control all of the songs should be recorded at ♩ = 100. The songs for the experimental groups should be recorded at the following tempos: "All Night, All Day," ♩ = 116; "If You're Happy," ♩ = 126; "A Tisket, A Tasket," ♩ = 84; and "Wonderful Copenhagen," ♩ = 60.

V. Teaching Procedure:

1. Warm-up. Have the group sing "Old Dan Tucker."
2. Have the group listen to the following. The teacher sings "Old Dan Tucker" and claps the rhythm.
3. The teacher asks the group if they heard a steady beat.
4. The teacher sings "Old Dan Tucker" and keeps a steady beat, emphasizing strong and weak beats.
5. The teacher asks the students about what they heard, for example: Were the beats steady? Were all of the beats the same? Were some beats louder than others? Was there a pattern?
6. Play the recordings of the songs. The students should keep a steady beat using classroom instruments. Allow the students to do this with as little help as possible from the teacher. Have students emphasize strong and weak beats if possible.

Unit XII

- I. Activities: listening, playing instruments, speech
- II. Sources: "Michael Finnegan" and the following songs from Teaching Music in the Elementary Classroom (1982) by Hoffer and Hoffer: "Good Night" p. 129; "Down by the Riverside," p. 208; "Down in the Valley" p. 260; "Go Tell it on the Mountain," p. 269.
- III. Concept:
 - A: Concept Area: rhythm
 - B: Concept Sentences: (1) Musical beat can be heard and duplicated. (2) Beats can be heard in sets of twos and threes. (3) The first beat of a set usually has the biggest sound.
 - C: Verbal Symbol: steady beat, strong beat, weak beat
- IV. Materials Needed: Cassette recorder, classroom instruments, and recordings of songs from Teaching Music in the Elementary Classroom at specific tempos. For the control groups the tempos should be as follows: "Good Night," ♩ = 100; "Down by the Riverside," ♩ = 100; "Down in the Valley," ♩ = 100; and "Go Tell it on the Mountain," ♩ = 100. For the experimental group the tempos should be as follows: "Good Night," ♩ = 108; "Down by the Riverside," ♩ = 63; "Down in the Valley," ♩ = 58; and "Go Tell it on the Mountain," ♩ = 126.
- V. Teaching Procedure:
 1. Warm-up. Have the group sing "Michael Finnegan."
 2. Have the group listen to the following. The teacher sings "Two, Four, Six, Eight" and claps the rhythm.
 3. The teacher asks the group if they heard a steady beat.
 4. The teacher sings "Michael Finnegan" and keeps a steady beat, emphasizing strong and weak beats.
 5. The teacher asks the students about what they heard, for example: Were the beats steady? Were all of the beats the same? Were some beats louder than others? Was there a pattern?
 6. Play the recordings of the songs. The students should keep a steady beat using classroom instruments. Allow the students to do this with as little help as possible from the teacher. Have students emphasize strong and weak beats if possible.

APPENDIX G
TEMPOS FOR UNITS OF INSTRUCTION

Derrick Elementary School

	<u>PT Group</u>	<u>Tempos</u> (M.M.)
Unit I	Slow	63 - 72
	Moderate	100
	Fast	132 - 112
Unit II	Slow	72
	Moderate	100
	Fast	112
Unit III	Slow	72 - 112
	Moderate	100 - 84
	Fast	112 - 92
Unit IV	Slow	112 - 126
	Moderate	84 - 63
	Fast	92 - 76
Unit V	Slow	126
	Moderate	63 - 58
	Fast	76
Unit VI	All	76, 88, 100
Unit VII	Slow	126 - 132
	Moderate	100 - 126
	Fast	76 - 58
Unit VIII	All	100, 88, 112
Unit IX	All	120, 132, 76, 69
Unit X	All	100, 63, 58, 108
Unit XI	All	116, 126, 84, 60
Unit XII	All	108, 63, 58, 126

Forest Elementary School

	<u>PT Group</u>	<u>Tempos</u> (M.M.)
Unit I	Slow Moderate Fast	58 - 66 100 - 116 126 - 112
Unit II	Slow Moderate Fast	66 - 84 116 - 132 112 - 92
Unit III	Slow Moderate Fast	84 - 96 116 - 108 92 - 72
Unit IV	Slow Moderate Fast	96 - 120 108 - 63 72 - 58
Unit V	Slow Moderate Fast	120 - 132 63 - 58 80 - 58
Unit VI	All	76, 88, 100
Unit VII	Slow Moderate Fast	126 - 130 100 - 120 76 - 58
Unit VIII	All	100, 88, 112
Unit IX	All	120, 132, 76, 69
Unit X	All	100, 63, 58, 108
Unit XI	All	116, 126, 84, 60
Unit XII	All	108, 63, 58, 126

APPENDIX H
PERSONAL TEMPOS FOR EACH SUBJECT

Derrick Elementary School-Control Group

<u>Code</u>	<u>PT1</u>	<u>PT2</u>	<u>PT3</u>	<u>PT4</u>	<u>AVG_PT</u>	<u>C.V.</u>	<u>S.D.</u>
1	122.71	115.29	113.12	141.65	123.19	10.52	12.97
2	84.65	75.29	99.82	88.69	87.11	11.66	10.16
3	70.64	94.57	108.99	106.28	95.12	18.37	17.47
4	100.41	99.56	117.02	110.18	106.79	7.81	8.34
5	121.77	119.37	147.44	133.79	130.59	9.86	12.88
6	55.79	54.18	61.27	66.72	59.49	9.57	5.69
7	137.68	137.32	133.67	122.76	132.86	5.24	6.97
8	148.54	143.22	159.85	99.75	137.84	19.09	26.32
9	118.70	116.09	116.50	125.98	119.32	3.84	4.58
10	166.05	156.93	171.73	166.52	165.30	3.72	6.14
11	138.76	129.64	128.53	134.20	132.78	3.52	4.67
12	65.31	58.77	67.41	57.64	62.28	7.71	4.80
13	113.61	124.89	130.90	91.21	115.15	15.19	17.49
14	138.05	136.72	121.87	137.54	133.54	5.84	7.80
15	55.60	88.03	110.52	110.52	91.17	28.4	85.97
16	125.00	110.51	139.28	123.18	124.49	9.46	11.77
17	159.54	154.12	147.49	115.08	144.06	13.83	19.93
18	117.96	126.76	72.94	103.82	105.37	22.39	23.59
19	63.38	56.51	92.04	69.39	70.33	21.89	15.40
20	153.45	186.64	138.22	146.20	156.13	13.66	21.27

21	120.21	116.71	130.90	124.03	122.96	4.94	6.07
22	124.45	119.33	137.86	136.49	129.53	7.01	9.08
23	50.80	50.26	67.53	34.28	56.19	17.47	9.81

Derrick Elementary School-Experimental Group

Code	PT1	PT2	PT3	PT4	AVG PT	C.V.	S.D.
24	137.61	157.34	147.66	142.13	146.18	5.81	8.49
25	63.32	65.45	60.40	98.70	71.96	24.93	17.94
26	138.29	136.24	127.13	120.50	130.54	6.33	8.26
27	126.09	150.91	64.51	129.03	117.63	31.54	37.10
28	111.67	116.81	92.95	105.63	106.76	9.62	10.28
29	138.42	141.43	137.20	135.29	138.08	1.86	2.57
30	43.93	45.87	54.89	58.71	50.85	13.94	7.08
31	108.89	113.96	125.91	131.74	120.12	8.76	10.52
32	103.69	113.40	126.20	137.32	120.15	12.23	14.69
33	59.90	71.85	70.65	59.29	65.42	10.31	6.75
34	61.90	64.80	61.32	60.91	62.23	2.82	1.75
35	165.89	166.82	165.24	145.96	160.97	6.23	10.03
36	99.75	90.09	93.38	98.09	95.32	4.62	4.41
37	117.54	119.78	115.89	127.77	120.24	4.37	5.26
38	57.41	58.45	105.00	76.55	74.35	29.91	22.24
39	60.05	59.40	62.60	55.69	59.43	4.80	2.85
40	119.56	137.14	120.50	157.59	133.69	13.35	17.85
41	155.53	128.11	117.74	101.35	127.68	18.09	22.74
42	44.55	60.45	73.49	89.94	67.10	28.73	19.28
43	88.88	98.45	103.73	78.06	92.28	12.24	11.29
44	40.47	47.50	67.35	63.97	54.82	23.55	12.91
45	68.06	76.57	68.23	92.98	76.46	15.31	11.70
46	118.06	131.02	116.22	116.29	120.39	5.92	7.13

47	70.46	99.21	89.83	118.38	94.47	21.10	19.93
48	90.70	99.75	108.49	137.40	99.64	8.92	8.89

Forest Elementary School-Control Group

<u>Code</u>	<u>PT1</u>	<u>PT2</u>	<u>PT3</u>	<u>PT4</u>	<u>AVG PT</u>	<u>C.V.</u>	<u>S.D.</u>
49	73.61	64.02	62.87	66.24	66.68	7.23	4.82
50	161.14	151.38	147.45	143.44	150.85	5.02	7.58
51	185.68	177.77	121.97	139.65	156.26	19.47	30.44
52	113.96	123.82	126.31	146.34	127.60	10.64	13.57
53	96.60	108.69	112.67	111.62	107.39	6.88	7.39
54	164.98	184.08	164.23	159.43	168.18	6.47	10.88
55	95.15	137.79	66.04	120.50	104.87	29.80	31.25
56	76.40	77.98	103.94	105.65	90.99	17.54	15.96
57	54.44	56.49	175.50	80.21	91.66	62.29	57.10
58	133.08	141.94	140.28	119.70	133.75	7.57	10.12
59	111.28	46.87	70.27	57.73	71.53	39.37	28.16
60	88.77	121.54	80.76	97.51	97.14	18.16	17.64
61	90.10	112.67	125.00	116.81	111.14	13.43	14.93
62	133.20	144.95	146.34	112.85	134.33	11.52	15.48
63	139.41	91.27	124.89	108.26	115.95	17.94	20.80
64	54.20	66.17	77.56	77.84	68.94	16.29	11.23
65	76.43	78.43	139.28	97.79	97.98	29.76	29.16
66	81.30	120.10	116.81	95.51	103.43	17.73	18.34
67	59.83	57.49	65.87	94.18	69.34	24.41	16.93

Forest Elementary School-Experimental Group

<u>Code</u>	<u>PT1</u>	<u>PT2</u>	<u>PT3</u>	<u>PT4</u>	<u>AVG PT</u>	<u>C.V.</u>	<u>S.D.</u>
68	71.82	107.75	117.54	133.67	107.69	24.32	26.19
69	171.59	133.63	148.14	151.51	151.22	10.34	15.64
70	41.92	54.05	66.91	70.90	58.44	22.50	13.15

71	122.79	121.32	121.99	138.19	126.07	6.42	8.10
72	79.15	110.29	141.68	112.04	110.79	23.05	25.54
73	39.96	53.83	51.28	41.37	46.61	14.94	6.96
74	86.09	90.73	106.04	126.55	102.35	17.82	18.24
75	102.91	123.82	78.74	100.08	101.38	9.86	12.88
76	58.66	64.13	74.73	74.33	67.96	11.63	7.90
77	151.21	153.14	114.98	120.37	134.92	14.86	20.05
78	65.45	71.29	80.38	95.50	78.15	16.75	13.09
79	55.29	55.68	80.38	94.00	71.33	26.81	19.13
80	65.63	70.17	66.48	65.27	66.88	3.35	2.24
81	102.36	106.66	99.66	123.82	108.12	10.03	10.85
82	52.35	53.90	49.92	57.46	53.40	5.91	3.15
83	63.38	69.44	94.24	77.85	76.22	17.57	13.39
84	64.80	75.88	107.81	83.06	82.88	21.99	18.23
85	126.07	145.79	114.78	115.38	125.50	11.54	14.48
86	75.06	86.29	113.74	89.87	91.24	17.83	16.27

APPENDIX I
MEAN SCORES OF PERSONAL TEMPO GROUPS
ACCORDING TO M.M.

<u>Item</u>	<u>Item Tempo</u> (M.M.)	<u>Group</u>	<u>Mean Score</u>	<u>N</u>
6	57	slow	3.000	25
		moderate	2.870	23
		fast	2.505	38
3	60	slow	2.387	25
		moderate	2.000	23
		fast	1.991	38
12	64	moderate	2.884	23
		slow	2.800	25
		fast	2.441	38
5	70	slow	3.093	25
		moderate	2.870	23
		fast	2.775	38
9	81	moderate	3.522	23
		slow	3.480	25
		fast	3.108	38
7	85	moderate	3.188	23
		slow	3.147	25
		fast	3.044	38
4	90	moderate	3.406	23
		slow	3.267	25
		fast	3.175	38
10	96	moderate	3.275	23
		slow	3.093	25
		fast	2.974	38
14	100	moderate	3.159	23
		slow	2.973	25
		fast	2.833	38
13	103	moderate	3.609	23
		fast	3.386	38
		slow	3.307	25

<u>Item</u>	<u>Item Tempo</u> (M.M.)	<u>Group</u>	<u>Mean Score</u>	<u>N</u>
1	104	fast	3.860	38
		moderate	3.739	23
		slow	3.480	25
2	113	fast	3.447	38
		slow	3.387	25
		moderate	3.188	23
8	120	fast	2.851	38
		slow	2.533	25
		moderate	2.333	23
11	130	fast	3.070	38
		slow	2.920	25
		moderate	2.739	23

APPENDIX J
PRETEST AND POSTTEST INTERSCORER RELIABILITIES
ACCORDING TO CRONBACH'S ALPHA

<u>Test Item</u>	<u>Pretest</u>	<u>Posttest</u>
1.	.7689	.7915
2.	.8705	.8657
3.	.8867	.8989
4.	.9135	.9086
5.	.9134	.8705
6.	.9332	.8699
7.	.9132	.8740
8.	.8909	.8692
9.	.8859	.8424
10.	.9106	.8687
11.	.8850	.8592
12.	.8977	.8918
13.	.8561	.8786
14.	.8885	.8704
Mean	.8600	.8800

REFERENCES

- Allport, G. W., & Vernon, P. E. (1933). Studies in expressive movement. New York: Hafner.
- Anderson, W. M., & Lawrence, J. E. (1985). Integrating music into the classroom. Belmont, CA: Wadsworth.
- Boardman, E., & Andress, B. (1981). The music book (Teacher's Edition, grade 3). New York: Holt, Rinehart, and Winston.
- Borg, W. R., & Gall, M. D. (1983). Educational research: An introduction (4th ed). New York: Longman.
- Boyle, J. D. (1970). The effects of prescribed rhythmical movements on the ability to read music at sight. Journal of Research in Music Education, 18, 307-318.
- Choksy, L., Abramson, R. M., Gillespie, A. E., & Woods, D. (1986). Teaching music in the twentieth century. Englewood Cliffs, NJ: Prentice-Hall.
- Crook, E., Reimer, B., & Walker, D. S. (1985). Silver-Burdett music: Centennial edition (Teacher's Edition, grade 3). Morristown, NJ: Silver Burdett.
- Dewey, J. (1934). Art as experience. New York: Milton, Balch and Co.
- Driver, A. (1936). Music and movement. New York: Oxford University Press.
- Findlay, E. (1971). Rhythm and movement: Applications of Dalcroze eurhythmics. Evanston, IL: Summy-Birchard.
- Frischeisen-Kohler, I. (1933). The personal tempo and its inheritance. Character and Personality, 1, 301-313.
- Froseth, J. O. (1987). MLR training series: Primary measures of kinesthetic response. Chicago: G.I.A.
- Gordon, E. E. (1965). Musical aptitude profile. Boston: Houghton Mifflin.
- Gordon, E. E. (1980). Learning sequences in music: Skill, content, and patterns. Chicago: G.I.A. Publications.

- Groves, W. C. (1966). Rhythmic training and its relationship to the synchronization of motor-rhythmic responses (Doctoral dissertation, University of Arkansas, 1966). Dissertation Abstracts, 27, 702A-703A.
- Harrison, R. (1941). Personal tempo and the interrelationships of voluntary and maximal rates movement. The Journal of General Psychology, 24, 343-379.
- Harrison, R., & Dorcus, R. M. (1938). Is rate of voluntary bodily movement unitary. The Journal of General Psychology, 18, 31-39.
- Hoffer, C. R., & Hoffer, M. L. (1982). Teaching music in the elementary classroom. New York: Harcourt Brace Jovanovich.
- Hoffer, C. R., & Hoffer, M. L. (1987). Teaching music in the elementary classroom: Musicianship and teaching. New York: Harcourt Brace Jovanovich.
- Jaques-Dalcroze, E. (1917). The eurythmics of Jaques-Dalcroze (2nd ed.). London: Constable.
- Jaques-Dalcroze, E. (1921). Rhythm, music and education. (H. F. Rubinstein, Trans.). New York: G. P. Putnam's Sons.
- Jersild, A. T., & Bienstock, S. F. (1935). Development of rhythm in young children. Child Development Monographs, No. 22.
- Joseph, A. S. (1983). A Dalcroze eurythmics approach (Doctoral dissertation, Carnegie-Mellon University, 1983), Dissertation Abstracts International, 44, 420-A.
- Kodaly, Z. (1969). Pentatonic music: 100 little marches (Vol. 2). London: Boosey Hawkes.
- Landis, B., & Carder, P. (1972). The eclectic curriculum in American music education: Contributions of Dalcroze, Kodaly and Orff. Reston, VA. Music Educators National Conference.
- Meske, E. B., Pautz, M. P., Andress, B., & Willman, F. (1988) Music (1st grade ed.). New York: Holt, Rinehart and Winston.
- Meyer, L. B. (1967). Music, the arts and ideas: Patterns and predictions in twentieth-century culture. Chicago: The University of Chicago Press.

- Moore, J. L. S. (1984). Rhythm and movement: An objective analysis of their association with music aptitude (Doctoral dissertation, University of North Carolina at Greensboro, 1984). Dissertation Abstracts International, 45, 1328-A.
- Mursell, J. L. (1956). Music education, principles and programs. Morristown, NJ: Silver Burdett.
- Music K-6. (1974). Albany, NY: The State Education Department, Bureau of Elementary Curriculum Development.
- Newman, G. (1984). Teaching children music: Fundamentals of music and method (2nd ed.). Dubuque, IA: Wm. C. Brown.
- Nye, R. E., & Nye, V. T. (1985). Music in the elementary school (5th ed.). Englewood Cliffs, NJ: Prentice-Hall.
- Palmer, M. H. (1974). The relative effectiveness of the Richards and the Gordon approaches to rhythm reading for fourth grade children (Doctoral dissertation, University of Illinois). Dissertation Abstracts International, 35, 7702A-7703A.
- Palmer, M., Reilly, M., L., & Scott, C. R. (1988). World of music (1st grade ed.). Morristown, NJ: Silver Burdett and Ginn.
- Regner, H. (Co-ordinator). (1977). Music for children: Orff-Schulwerk American edition (Vol. 2). London: Schott.
- Reimer, B. (1970). A philosophy of music education. Englewood Cliffs, NJ: Prentice-Hall.
- Riemer, B., & Evans, E. G., Jr. (1972). The experience of music. Englewood Cliffs, NJ: Prentice-Hall.
- Rimoldi, H. J. A. (1951). Personal tempo. Journal of Abnormal Psychology, 46, 283-303.
- Ruckmich, C. A. (1913). The role of kinaesthesia in the perception of rhythm. The American Journal of Psychology, 24, 305-359.
- Smoll, F. L. (1975a). Preferred tempo in performance of repetitive movements. Perceptual Motor Skills, 40, 439-442.
- Smoll, F. L. (1975b). Preferred tempo of motor performance: Individual differences in within-individual variability. Journal of Motor Behavior, 7, 259-263.

- Smoll, F. L., & Schutz, R. W. (1978). Relationships among measures of preferred tempo and motor rhythm. Perceptual and Motor Skills, 46, 883-894.
- Staton, B., & Staton, M. (1988). Music and you (1st grade ed.). New York: Macmillan.
- Thackray, R. (1969). Music education research papers: An investigation into rhythmic abilities (No. 4). London: Novello.
- Thackray, R. (1972). Music education research papers: Rhythmic abilities in children (No. 5). London: Novello
- 357 songs we love to sing. (1938). Melville, NY: Schmitt, Hall & McCreary.
- Walters, D. L. (1983). The relationship between personal tempo in primary-aged children and their ability to synchronize movement with music (Doctoral dissertation, University of Michigan, 1983). Dissertation Abstracts International, 44, 423A.
- Williams, H. M., Sievers, C. E., & Hattwick, M. S. (1932). The measurement of musical development. (Studies in Child Welfare; Vol. 7, No. 1. Iowa City: University of Iowa.

BIOGRAPHICAL SKETCH


Diane Dampier Nelson was born at Fort Lee, Virginia, and attended public schools in Jacksonville, Florida. She earned her Bachelor of Music Education degree from Jacksonville University in Jacksonville, Florida. After being a school music teacher for two years, she attended the the Southern Baptist Theological Seminary in Louisville, Kentucky, and graduated in 1981. While a student at the seminary, she studied piano with Maurice Hinson, and her area of emphasis was conducting.

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I certify that I have read this study and that in my opinion it conforms to acceptable standards of scholarly presentation and is fully adequate, in scope and quality, as a dissertation for the degree of Doctor of Philosophy.


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